Stakeholder Engagement Process

The Public Service Commission of South Carolina provides the following records from two dockets, one pre-pandemic and one post-pandemic, that offer useful insight into the stakeholder engagement process. They are intended to provide useful information for the management of Santee Cooper.

Stakeholder Engagement Process

Docket No. 2018-318-E

Summary Report of South Carolina Duke Energy Grid Improvement Workshop

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Prepared by Rocky Mountain Institute
Rocky Mountain Institute Contact: Coreina Chan, cchan@rmi.org

Executive Summary

Duke Energy hosted a technical workshop on October 10, 2018 regarding the Company's South Carolina Grid Improvement Initiative to explain the need for and ongoing benefits of grid investments, and to hear feedback from stakeholders in attendance. This workshop was specifically designed to focus on the grid improvement plan and did not address (1) what cost recovery would be used to pay for the plan, or (2) interrelated topics such as regulatory reform or integrated resource planning.

Acting as a neutral facilitator, a team from Rocky Mountain Institute (RMI) convened 57 participants (inclusive of 20 Duke Energy and four RMI staff) for a workshop that included content presentations, structured feedback sessions, and facilitated small group breakout sessions. RMI captured detailed notes for all small group and plenary discussions and conducted an anonymous post-event survey among non-Duke, non-RMI attendees to gather stakeholder feedback.

This document provides a summary of the day's discussions and outcomes, as well as a summary of survey results. This document contains an anonymized synthesis of what was shared by participants, and does not attribute specific comments to specific parties, to respect the ground rules agreed to by participants at the beginning of the meeting. Specifically, participants agreed that what was discussed at the workshop could be shared publicly, but specific comments could not be attributed to individuals without their permission.

The Appendix contains detailed notes from breakout discussions and question and answer sessions.

Workshop objectives

The workshop was organized around three objectives, listed below. RMI defined these objectives in consultation with Duke Energy and other participants interviewed in advance of the event.

- **Objective 1:** Obtain stakeholder input to Duke's outlook on seven megatrends shaping grid improvement decisions.
- **Objective 2:** Describe and get feedback on how Duke Energy has used stakeholder input, the impact of megatrends on grid needs and a prioritization methodology to develop a grid improvement portfolio.
- **Objective 3:** Describe the benefits and risks of the proposed program portfolio and get stakeholder feedback prior to Q4 filing.

Key workshop outcomes and takeaways

As described below, and supported by the rest of this report, there were a number of key workshop insights and outcomes.

1. **Participants generally viewed the pre-read materials and workshop as well-structured and informative, and felt the engagement provided insight into**

Duke Energy's priorities and decision-making processes. Survey and Poll Everywhere results suggest that nearly all stakeholders found this opportunity to review Duke's thinking and process valuable.

2. **Stakeholders were especially interested in further quantitative information about the megatrends and implications portion of the workshop.** For example, several expressed an interest in "seeing numbers" to provide additional detail to the heat maps on slide 34 of the pre-read.
3. **Several stakeholders stated the new plan reflected that Duke Energy had listened to stakeholder feedback.** Stakeholder feedback during the plenary question and answer sessions, online polling and survey indicated that many generally agreed the revised grid improvement filing plan had improved since the first plan.
4. **Generally, stakeholders aligned with Duke Energy on the utility's outlook on megatrends and their implications, but did have key feedback including:**
    a. Costs: several discussion groups pointed out their concerns and questions about how the grid improvement plan would result in rate impacts across different customer groups
    b. Environmental factors: almost all groups mentioned the increasing importance of climate change and how climate change urgency should be given more focus in the megatrends and implications
    c. Technology: general consensus was that the megatrends and implications may be underestimating the impacts of rapid adoption of technologies like solar, storage and electric vehicles
5. **Generally, stakeholders had a positive impression of the Q4 filing but did have key questions and concerns, including**:
    a. What cost recovery mechanism would be used to pay for this plan?
    b. How would benefits/costs be shared equitably by South Carolinians?
    c. What is the quantified vision for renewables penetration and distributed energy resources (DER) hosting capacity?
6. **Stakeholders expressed interest in continued engagement with Duke Energy, both related to the Q4 filing and other future efforts.** Feedback from the plenary, online polling and survey indicated a strong interest in continued engagement.

We obtained stakeholder feedback throughout the workshop via online polling, table discussions, and plenary question and answer sessions. Themes emerging from the conversations during the workshop and in the post-event surveys are summarized in the report, with supporting detail in the Appendix.

Workshop Activities and Attendee List

RMI consulted with both Duke Energy and other participants in pre-workshop meetings and heeded calls to design the workshop agenda to best meet the objectives. The workshop agenda as executed is included below in Table 1.

Table 1: October 10 Technical Workshop Agenda

Time	Activity	Objectives addressed
9:00	Welcome remarks	
9:15	Check-in and introductions	
9:30	Presentation (Duke Energy) Executive Summary: Q4 Filing	#1, #2, #3
9:45	Activity: Polling, feedback and questions	#1
10:25	Presentation (Duke Energy): Megatrends and Implications	#1, #2
11:30	Lunch	
12:15	Presentation (Duke Energy): Portfolio Prioritization Method	#2, #3
12:35	Activity: Polling, feedback and questions	#1, #2, #3
1:15	Presentation (Duke Energy): Q4 Filing Overview	#2, #3
2:15	Next steps for stakeholders	#3
2:30	Closing remarks and adjournment	

A total of 54 participants attended the technical workshop, including 20 participants from Duke Energy and four from RMI. A full list of attendees is included below in Table 2.

Table 2: October 10 Technical Workshop Attendees

Last Name	First Name	Organization Name
Allsbrook	Wes	CEPCI
Blade	Paul	Conservation Voters of South Carolina
Boyt	John	Central Electric Power Cooperative Inc.
Brooks	Jeff	Duke Energy
Brown	Justin	Duke Energy
Burnett	John	Duke Energy
Chan	Coreina	RMI
Claunch	Chuck	Duke Energy
Coppola	Barbara	Duke Energy
Culley	Thad	Vote Solar
Davidson	Hilary	Duke Energy
Dover	Becky	SC Department of Consumer Affairs
Von Nessen	Joey	University of South Carolina
Dyson	Mark	RMI
Ferguson	Stinson	SELC
Finnigan	John	EDF
Fitch	Tyler	Vote Solar
Glenn	Alex	Duke Energy
Hall	Karen	Duke Energy
Hancock	Alan	SC Coastal Conservation League
Hartman	Beth	RMI
Hipp	Dawn	South Carolina Office of Regulatory Staff (ORS)
Hutchison	Nikki	AARP
Jacob	Bryan	Southern Alliance for Clean Energy (SACE)
Jiran	Rick	Duke Energy
Johnson	Sarah	South Carolina Office of Regulatory Staff (ORS)
King	Trip	Audubon South Carolina
Kruse	Susan	Duke Energy
Lawyer	Robert	South Carolina Office of Regulatory Staff (ORS)
Maley	Daniel	Duke Energy
Martin	Jason	Duke Energy
McLawhorn	James T.	Columbia Urban League
Mitchell	William	Conservation Voters of South Carolina
Moore	Eddy	Coastal Conservation League
Morgan	Willie	South Carolina Office of Regulatory Staff (ORS)
Mosier	Ryan	Duke Energy

Oliver	Jay	Duke Energy
Preston	Marcus	Duke Energy
Rice	Chris	Nucor Steel South Carolina
Rivers	Hope	Executive Vice President
Robbins	Shelley	Upstate Forever
Rogers	David	Sierra Club
Ruhe	Mike	Duke Energy
Ruoff	John	SC Appleseed Legal Justice Center
Sandonato	Anthony	South Carolina Office of Regulatory Staff (ORS)
Sharpe	Chris	Duke Energy
Shirley-Smith	Heather	Duke Energy
Simpson	Bobby	Duke Energy
Sipes	Robert	Duke Energy
Slater	Loretta	Whitney Slater Foundation
Smith	Robert	MVA Nucor
Teplin	Chaz	RMI
Wilkerson	Brandon	South Carolina Department of Commerce
Woodberry	Leo	New Alpha Community Development Corporation

Workshop Outcomes

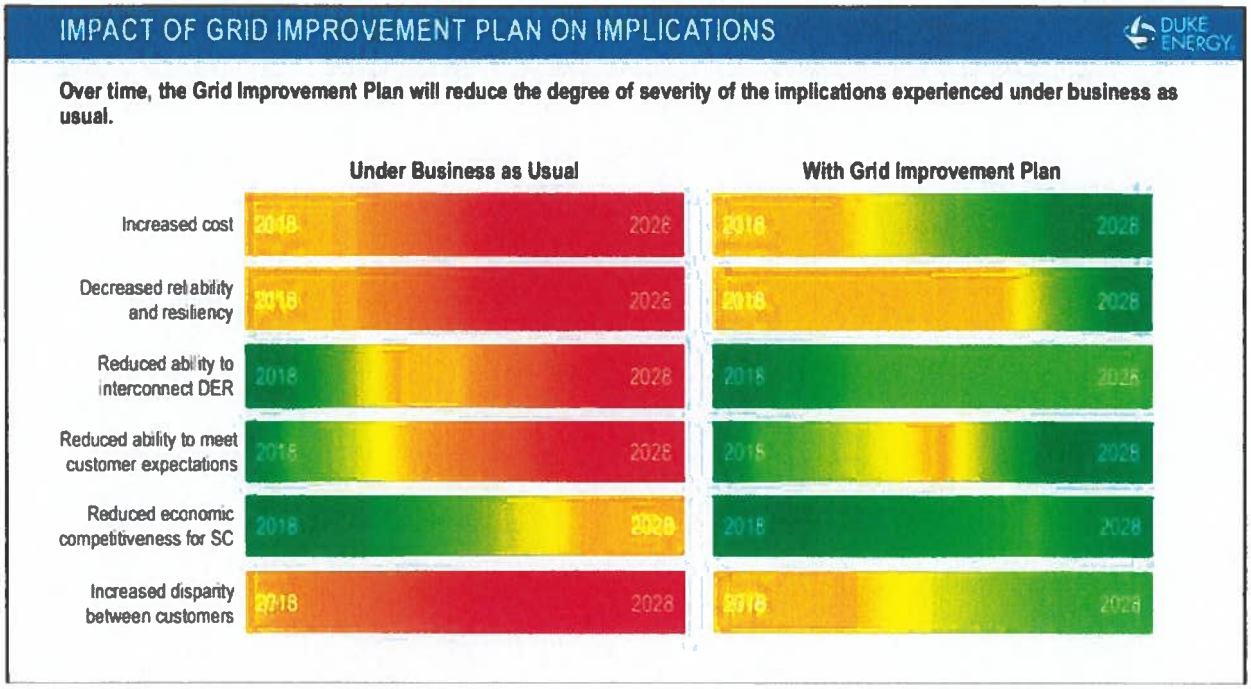
The following sections outline the workshop activities, common themes of discussion, and outcomes associated with each of the three workshop objectives. RMI developed these summaries based on notes taken during the workshop as well as online polling during the workshop and the results of the anonymous survey distributed to participants (excluding Duke Energy and RMI staff) afterwards. There was a 60% response rate to the survey.

Objective 1

Obtain stakeholder input to Duke Energy's outlook on seven megatrends shaping grid improvement decisions.

Supporting Activities

- **Pre-Read**: In the pre-read sent to participants, Duke Energy identified seven megatrends shaping near and long-term grid improvement needs, and the potential implications of these megatrends on customer service under a business-as-usual scenario (no grid improvement). Duke Energy compared the outlook for grid performance under business-as-usual vs. grid improvement plan scenarios, using the following qualitative summary slide:



- **Workshop Presentations**: The fourth quarter filing executive summary at the beginning of the workshop touched on all three main objectives including describing the megatrends and implications for grid improvement decisions. Next, a more detailed presentation from Duke Energy (see Attachments for all presentations) reviewed the seven megatrends impacting the energy industry overall, to explain the rationale for grid improvement investments.
- **Workshop Discussion**: Following the presentation on megatrends and their implications, several feedback activities collected input from stakeholders including a plenary rapid-fire question and answer session, plenary real-time online polling, and facilitated dialogues at tables. Five tables reported out to the room on the key takeaways from their discussions. These discussions were not designed to reach consensus but rather to highlight areas of common interest and concern.

Summary of discussion points

- Costs: several discussion groups pointed out their concerns and questions about how the grid improvement plan would result in rate impacts across different customer groups
- Environmental factors: almost all discussion groups mentioned the increasing importance of climate change and how climate change urgency should be given more focus in the megatrends and implications

- Reliability: several discussion groups mentioned the risk of power interruptions (e.g., during future storms) and the importance of improving reliability in future, especially for industrial customers.
- Technology: several stakeholders voiced that the megatrends and implications may be underestimating the impacts of rapid adoption of technologies like solar, storage and electric vehicles
- Additional key trends identified by participants included (1) flattening load growth, and (2) quickly evolving customer expectations, especially from the next generation(s) of customers.

Gauging Stakeholder Alignment

Real-time polling questions indicated that participants were directionally aligned with how Duke Energy views megatrends. Polling responses indicated similar levels of participant alignment with Duke Energy on potential megatrend implications on customer service and need for a grid improvement strategy:

Figure 1: Real-time online polling responses – "How aligned are you with how Duke Energy views these 7 megatrends?"

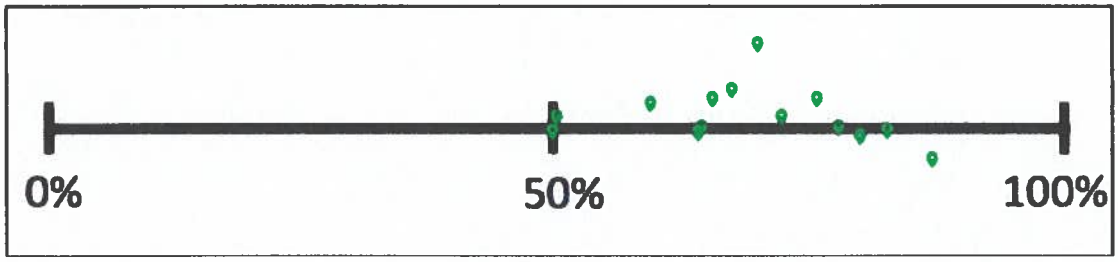
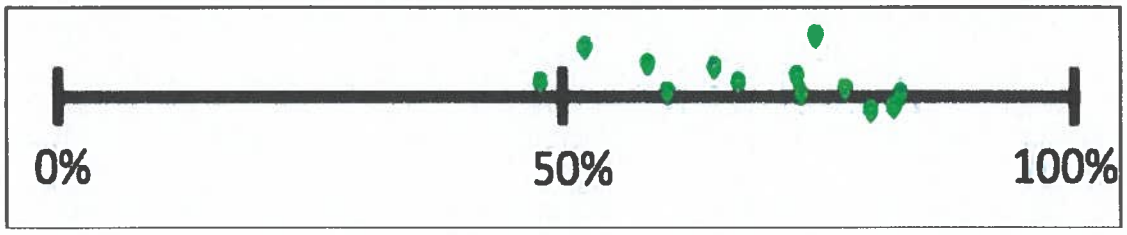


Figure 2: Real-time online polling responses - "How aligned are you with how Duke Energy views the implications to these 7 megatrends?"



In addition to real-time online polling, RMI asked participants to fill out a post-event survey to better understand stakeholder feedback. All participants indicated in the survey that the workshop improved their understanding of Duke Energy's framing of grid improvement in the context of megatrends and implications, with everyone giving a score over 5 out of 10 and the majority of respondents at 8 or above.

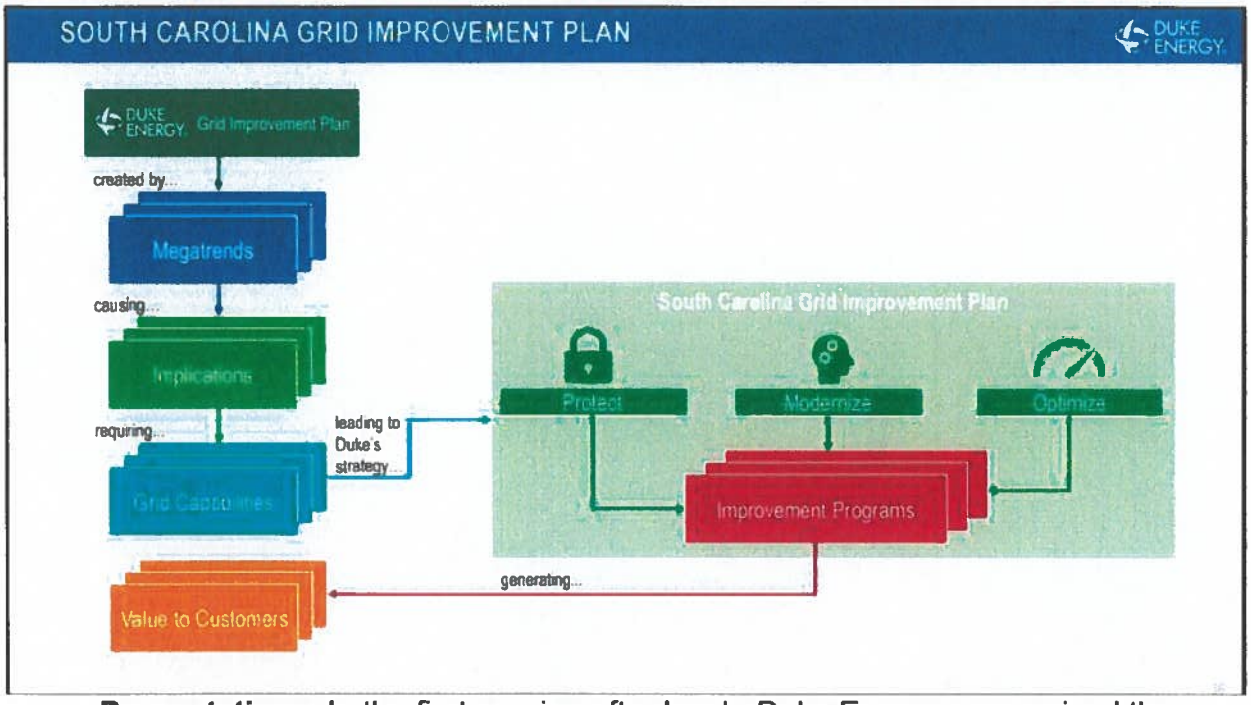
Figure 3: Post-event survey responses - "On a scale of 1 to 10, How well did this workshop enhance your understanding of the proposed grid improvement plan?"

Objective 2

Describe and get feedback on how Duke Energy has used stakeholder input, the impact of megatrends on grid needs and a prioritization methodology to develop a grid improvement portfolio.

Supporting Activities

- **Pre-Read:** In the pre-read sent to participants, Duke Energy outlined their process for using stakeholder input, megatrends and grid needs to create a Grid Improvement Plan. The summary slide is included below.



- **Presentations**: In the first session after lunch, Duke Energy summarized the company's analytic process, including more details on the interruption cost estimate (ICE) model developed by the Department of Energy (DOE) to value the cost of outages. The presentation explained how the company categorizes grid needs as "Optimize," "Modernize," or "Protect" and showed two examples of cost–benefit analysis, one at the program level for self-optimizing grid and one at the project level for targeted undergrounding.
- **Discussion**: After this Duke Energy presentation, participants grouped themselves into pairs to discuss 'What questions, if any, do you have about what was presented?' After 10 minutes, participants were asked to record their questions and the questions were answered in plenary by Duke Energy executives to help raise the overall level of understanding in the room. The questions are listed here:

1) How are environmental benefits calculated?
2) Specifically, what is the formula for DER enablement?
3) What is the discount rate for net present value?
4) Can you provide more detail on ICE, i.e., is it proprietary?
5) How will Duke Energy allocate costs between C&I versus residential customers to reflect benefits?
6) How does Duke Energy distinguish between "maintain" and "improve" for targeted undergrounding?

7) How will you consider the option for microgrids as an alternative to targeted underground more broadly?

Question and Answer Summary

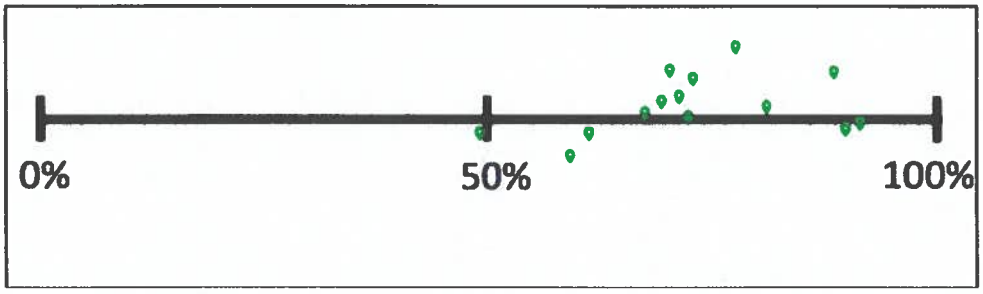
Duke staff answered questions in plenary. Discussion focused largely on environmental benefits and the models used to calculate cost-benefit for different types of programs and projects. These questions and answers were not intended to reach consensus with stakeholders but rather to explain Duke Energy's analytic approach or perspective. Answers are summarized below:

- Environmental benefits were calculated by considering benefits like additional capacity for peak shaving and reduced SO_2, NO_X, and CO_2 emissions. Other benefits of interest to stakeholders included enablement of DER and electric vehicle (EV) charging, and flexibility for other future technologies.
- Net present value calculation uses the appropriate Duke discount rate for the service territory (approximately 7%).
- The ICE model is not proprietary and was created with a DOE-sponsored study to analyze typical costs of service interruptions for various customers including residential, small commercial, and large industrial.
- Targeted undergrounding addresses several megatrends, and projects will be deployed based on cost-benefit analysis to demonstrate value.
- There are many opportunities to use storage and microgrids in ways Duke Energy hasn't before. The focus is on having a positive net present value for storage such as a capacity need or a need to address a community that is underserved. Once you have storage you can use it to island or microgrid during peak demand, or support frequency regulation—the core value is deferring investment.
- All cost savings eventually go to the customer. Grid improvement programs that initially bring savings to Duke Energy will result in those savings being passed along to customers in the form of rates that increase less than under the base case of business as usual.

Gauging Stakeholder Alignment

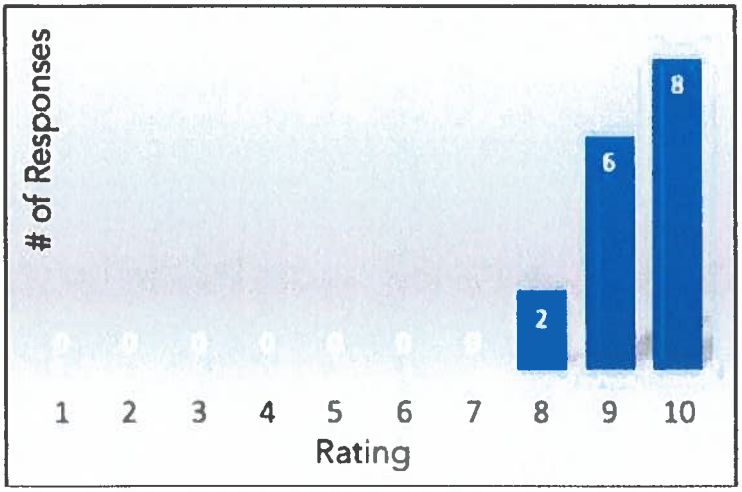
After the plenary question and answer session, participants were asked using real-time polling the following question that is relevant to the second objective: "To what extent do you believe this plan addresses the megatrends discussed earlier today?" The results, below, show that responding participants generally felt the plan addresses the megatrends described by Duke Energy.

Figure 4: Online polling: "To what extent do you believe this plan addresses the megatrends discussed earlier today?"



In addition to the real-time polling, the post-event survey asked participants, "On a scale of 1–10, How satisfied are you with the opportunity to provide feedback and dialogue with Duke Energy?" As shown in Figure 5 below, all 16 completed surveys indicated a score of 8 or higher.

Figure 5: Post-event survey: How satisfied are you with the opportunity to provide feedback to Duke Energy at this workshop?



Objective 3

Describe the benefits and risks of the proposed program portfolio and get stakeholder feedback prior to Q4 filing.

Supporting Activities

- **Pre-read**: In the pre-read sent to participants, Duke Energy outlined their Grid Improvement Plan in more detail, including cost ranges for each program area. The summary slide is included below.

Program	3 Year Range
Cost Benefit & Cost Effectiveness Justified (Optimize)	$228-373M
SOG	$75-122M
Incremental Distribution H&R	$35-60M
IVVC DEC	$35-57M
Incremental Transmission H&R	$25-40M
TUG	$22-36M
Energy Storage	$20-32M
Transmission Bank Replacement	$8-13M
D-OIL Breaker Replacements	$2-4M
T-OIL Breaker Replacements	$4-6M
DSDR peak shaving to CVR in DEP	$2-3M
Rapid Technology Advancement: Cost-Effectiveness Justified (Modernize)	$87-141M
T&D Communications	$33-53M
Distribution System Automation	$20-33M
Transmission System Automation	$17-28M
T&D Enterprise Systems	$5-8M
ISOP	$5-8M
DER Dispatch Tool	$3-5M
Electric Vehicle Charging	$3-4M
Power Electronics for volt/var control	$1-2M
Customer Data Access	$0.2-0.4M
Compliance: Cost Effectiveness Justified (Protect)	$44-72M
Physical Security	$30-50M
Cyber Security	$14-22M

- **Presentations:** Several presentations focused on describing the benefits and risks of the proposed program portfolio and getting stakeholder feedback prior to the Q4 filing. Specifically, the workshop started with a Q4 executive summary presentation and concluded with a more detailed overview of the filing. This detailed overview included a breakdown of the costs by program as well as a discussion of the heatmaps developed to explain the implications of megatrends and grid impacts.
- **Questions:** Following the detailed filing overview presentation, the workshop transitioned to an open question and answer session in plenary with several members of the Duke Energy staff. Many of the questions focused on the heat maps and addressed uncertainties in factors like renewable integration, EV adoption, and more. Costs and issues of customer equity also continued to be areas of focus.

Summary of Q&A

- Why is the heat map showing reduced ability to meet customer expectations with the orange in the middle? Duke Energy's response: There is uncertainty with factors like EVs and batteries and what will happen with expectations quickly changing around adoption of these new technologies.
- With regards to the reduced ability to connect DER in the improvement plan, what is the plan missing that would enable this to go from yellow to green? Duke Energy's response: The lighter shade of yellow represents an effort to optimize what we are doing to address the impacts in the most

cost effective way and also reveals uncertainty about trends in electric cars or batteries.

- Why is the heat map showing increased disparity between customers? Duke Energy's response: urban areas are growing and rural populations are declining—the traditional utility model is to serve the most load, which in this case would mean greater investments in urban areas, and fewer in rural. This plan includes deploying some electronics on the rural lines to reduce outages, easing the disparity between the self-optimizing urban grid and the rural service.
- With grid improvement, are you predicting costs will eventually be lower and will this correlate to a decrease in rates? Duke Energy's response: Yes, over the base case. When these programs kick in they will be more valuable than not. To do this cost-benefit analysis Duke Energy erred on the conservative side of only capturing the hard costs.

Gauging Stakeholder Feedback

Finally, the workshop transitioned to real-time polling questions to gather data from the entire room on overall support for the fourth quarter grid improvement filing plan. Overall, stakeholders were clustered in groups of around 50% support for the plan and closer to 75% support as described in Figure 6 below:

Figure 6: Online polling responses: "Based on what you've heard today, how supportive are you of this plan at this time?"

- **Final Discussion:** Following the plenary presentation, question and answer session, and online polling, the group separated into final table discussions around two questions: what are the strengths of this plan, and what issues and concerns do you have? Feedback from these discussions was captured by a Duke Energy representative taking notes at each table.

Summary of Table Discussion Points: Overall, workshop participants were supportive of Duke Energy's efforts to incorporate stakeholder feedback, and felt that the updated grid improvement plan was better than the first version. The ability to incorporate more

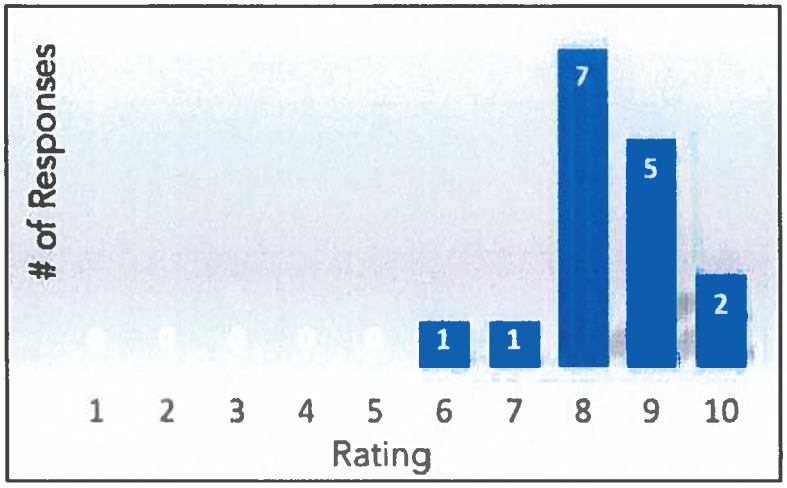
DERs along with increased amounts of storage, reduced targeted undergrounding, and a stronger focus on optimizing technologies like integrated volt/VAR control (IVVC) were all highlighted as positive elements of the plan. Concerns focused on cost and rate impacts along with more details on metrics and goals for DER integration and reduced centralized generation. Outside of plenary discussions, breakout groups discussed feedback on the filing and three tables reported back in plenary:

1. Participants at this table felt that Duke Energy had focused on listening to stakeholder feedback to revise the grid improvement plan. Specifically, stakeholders appreciated the inclusion of more storage, ability to accommodate increased renewables, and the focus on a self-optimizing grid. Their main issues and concerns focused on the unknown costs and rate impacts, along with an interest in learning more about how the plan would impact the transmission system in addition to the distribution system.
2. Participants were similarly supportive of Duke's focus on listening to and incorporating stakeholder feedback, specifically mentioning the use of a neutral third-party facilitator as a positive element of the input process. Concerns were also focused on cost impacts in addition to workforce development plans. There was also an interest in better understanding the differences between the first and second version of the filing plan, specifically asking why IVVC wasn't included in the first plan.
3. Along with incorporating stakeholder feedback, this group highlighted specific positive elements of the plan including flexibility, viewing DER as an opportunity rather than a threat, scaled back undergrounding efforts, and more robust cost-benefit analysis efforts. Concerns focused on costs, metrics and goals for DER integration, and more planning for less centralized generation.

Final Stakeholder Feedback

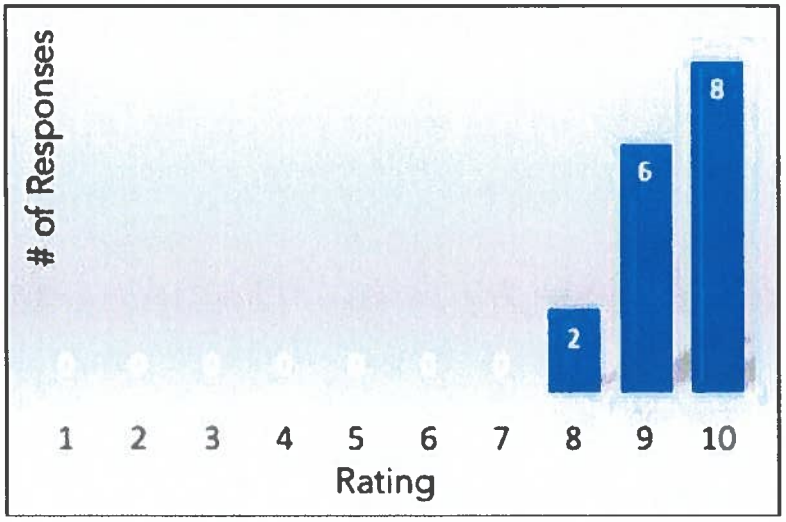
After this final round of discussion, Duke Energy collected a final round of feedback with survey responses. Based on these responses, participants overall indicated interest in continuing to engage with Duke Energy on grid improvement planning, and a majority stated that the workshop provided an effective foundation for future collaboration. Responses to each final survey question are summarized below:

Figure 7: Survey Question 1: "On a scale of 1–10, how well did this workshop enhance your understanding of the proposed grid improvement plan?



The first post-workshop survey questions asked attendees to assess how well the workshop improved their understanding of Duke Energy's grid improvement plan. The chart above shows the number of respondents that rated the workshop with a given rating. The 16 responses suggested that the workshop did improve their understanding of the plan: no responses rated the workshop less than 6 and 14 of the 16 responses rated the workshop greater than 7 on this question.

Figure 8: Survey Question 2: "On a scale of 1–10, how satisfied are you with the opportunity to provide feedback to Duke Energy at this workshop?

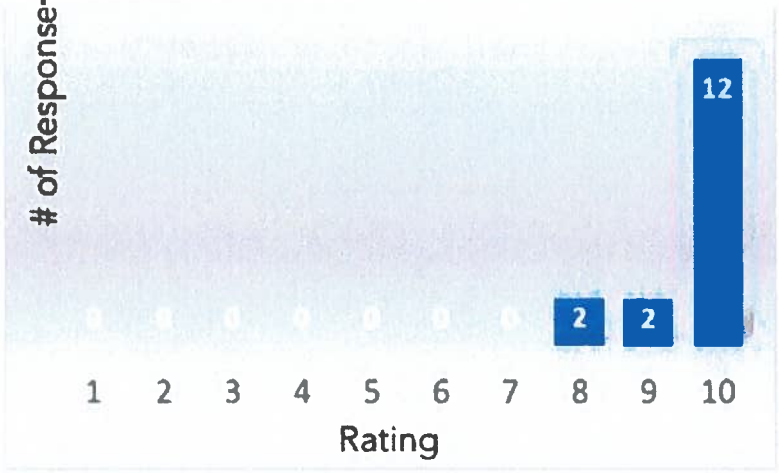


The second post-workshop survey question asked attendees to assess how well the workshop allowed them to provide feedback to Duke Energy. The chart above shows the number of respondents that rated the workshop with a given rating. The 16 responses indicate that attendees did feel that they had a chance to give Duke Energy feedback: no responses rated the workshop less than 8 and 14 of the 16 responses rated the workshop greater than 8 on this question.

Figure 9: Survey Question 3: "On a scale of 1–10, how well did this workshop enhance your understanding about other stakeholders' points of view?

The third post-workshop survey question asked attendees to assess how well the workshop allowed attendees to improve their understanding of other stakeholders' point of view. The chart above shows the number of respondents that rated the workshop with a given rating. The 16 responses suggested that the workshop did allow attendees to hear the perspective of other workshop attendees: no responses rated the workshop less than 7 and 12 of the 16 responses rated the workshop greater than 8 on this question.

Figure 10: Survey Question 4: "On a scale of 1–10, how willing are you to engage in potential future follow-up conversations with Duke around proposed grid improvement initiative?



The last post-workshop survey questions asked attendees if they were willing to engage in a future conversation with Duke around grid improvement. The chart above shows the number of respondents that rated the workshop with a given rating. The 16 responses suggested that the workshop attendees are overwhelmingly willing to engage with Duke on grid improvement going forward: all responses were an '8', '9' or '10' and 12 of the 16 responses were '10.'

Appendix 1: Executive Summary

After Duke Energy presented an initial executive summary of their view on the future of the grid, their process for creating an improvement plan and their Q4 filing plan, participants were asked "Based on what you just heard, what are the most urgent questions you have for Duke Energy about the Q4 filing?" RMI staff documented stakeholder questions posed on post-it notes below, grouped into the following categories:

- **Cost, Rate Impacts, Cost Recovery and Equity**, focused on plan costs and how those costs would be balanced among ratepayers:
  - What are the total cost and rate impacts?
  - What is the impact on the customer's cost and bill?
  - What are the rate impact and how will allocations and rate design be done?
  - What are you doing to protect consumers from a rate payer perspective (stabilizing costs)?
- **Distributed Energy and Renewables Integration**, focused on the extent to which grid improvements would enable future grid hosting capacity, and timeline, and on what timeline.
  - What assumptions is the preparing-for-renewables-section based on?
  - How will the proposed grid improvements increase opportunities for renewable energy especially solar?
  - How will this second proposal increase DER integration compared to the first proposal?
  - At what total level will DER be integrated and on what timeline?
- **Cost-benefit** focused on detailed cost-benefit analysis of the proposed grid improvements.
  - Where is the detailed cost-benefit study?
  - What is the real value to each customer class?
  - When can we see the cost-benefit analysis for specific programs?
  - How is the value to customers balanced across classes?
- **Workforce Development**, focused on how and whether the plan opens up new opportunities for local jobs, and constraints on local trained worker capacity.
  - What is the community education plan?
  - Can you provide more information on the workforce development component and the role that the technical college system can play?
  - What is the impact on workforce development?
- **Others**
  - What is the grid improvement plan for the 44 KV transmission system in the DEC area?
  - What are you doing to protect the grid against artificial intelligence and cyberthreats?
  - What are the net environmental impacts?

Appendix 2: Megatrends and Implications

Q&A:

After Duke Energy's Megatrends and Implications presentation, participants had a chance to ask clarifying questions that were answered in real-time by Duke Energy representatives. This section provides a summary of the questions posed by stakeholders to Duke Energy staff, and notes from staff's real-time responses.

- "Why would you not add as an implication increased reliance on fossil fuels and environmental and cost implications of that?"
  - Cost risks of fossil fuels under business as usual are carried through as an understanding in all the implications presented. Under a business as usual where DER would not be enabled to as great a degree, baseload generation using fossil fuels would continue.
  - In certain programs we quantify base capacity avoidance and fuel implications from the grid improvement plan.
- "Do you foresee the plan addressing some of the transmission issues that are affecting some areas?"
  - Yes, various programs address these issues, including the program for the 44 kV DEC area, programs that impact intermittency and power quality, programs for volt-VAR control, and the DER dispatch tool that would address potential needs to curtail solar.
- "When I think about demographics I think about social and economic demographics. Can we focus on social and economic demographics rather than typical demographics like age, etc.?"
  - Yes, Duke Energy is thinking about all our customers for this plan.
  - For the low-income example, the fuel savings and energy usage savings from IVVC will create automatic efficiency and avoid capacity payment for future generation.
- "Could you tell us about the math behind the heat maps?"
  - At this point the heat maps are highly qualitative — in the nearer term we have more confidence in our data but moving out farther in time we get less quantitative and more qualitative.
- "[When will this plan cause...] increased customer options for rates?"
  - The impact to customer rates will occur as programs are implemented and new rates are approved by the Commission.
- "If avoiding increased costs is one of the primary goals (which should mean savings for consumers), do you have a sense of the balance between when you have to capture costs in order to implement, and when we as consumers will see those savings?"
  - The answer to that question is program dependent.

- For example, the DEP volt-VAR control program has a high potential payback of around 30 to 1; you will spend money over 4 years and that money will "come back quickly."

Polling Questions

Following the Q&A, participants answered polling questions and engaged in table discussion on those questions.

"How aligned are you with how Duke Energy views these seven megatrends?"

Several stakeholders offered explanations for why they responded as they did:

- 75%: One stakeholder agreed with Duke Energy on the megatrends but felt they don't sufficiently capture the full importance of climate change. The stakeholder referred to the Intergovernmental Panel on Climate Change report released the same week as the workshop to underscore the importance of climate change.
- 75%: Another stakeholder also largely agreed with Duke Energy and mentioned that his organization gets involved with grid modernization programs around the country to help ensure they are implemented in a cost-effective way. The stakeholder was involved in the grid modernization plan in North Carolina and had an opportunity to present recommendations. Looking at the megatrends that were identified here it appears that Duke Energy adopted many of the suggestions.
- 50%: Another stakeholder was closer to halfway agreement, not because he disagreed that those are the megatrends we are seeing today, but because having worked on utility issues for 40 years, he recognizes the large degree of uncertainty around trends. Part of the challenge in developing trend outlooks is building in flexibility and sharing risk around "who pays for inaccurate projections."
- 50%: Another stakeholder was at 50% or lower agreement because of the need for greater emphasis on weather impacts. This stakeholder also highlighted and expressed support for the trend NGOs have for looking for energy solutions that are more community based.
- 50%: A final stakeholder was also at 50% or lower because she felt that the plan gave insufficient focus to impacts on the environment.

"How aligned are you with how Duke Energy views the implications for South Carolina?"

Stakeholders offered explanations for why they responded as they did:

- Stakeholders indicated that their answers to this polling question were largely reflected in their responses to the previous question on megatrends.
- One stakeholder added that environmental factors should be a larger component of the implications.

Table discussions

Stakeholders were asked to discuss the following question: "Where do you share common ground with Duke Energy? What's missing? Where do you differ? Why?

Common themes among the responses included:

- Costs: Several discussion groups raised concerns and questions about how the grid improvement plan would result in rate impacts across different customer groups.
- Environmental factors: Almost all groups mentioned the increasing importance of climate change and how climate change urgency should be given more focus in the megatrends and implications.
- Reliability: Several groups mentioned the risk of power interruptions (e.g., during future storms) and the importance of improving reliability in future, especially for industrial customers.
- Technology: Several stakeholders voiced that Duke Energy's megatrends and implications presentation may be underestimating the impacts of rapid adoption of technologies like solar, storage and electric vehicles
- Additional key trends identified by participants included (1) flattening load growth, and (2) quickly evolving customer expectations, especially from the next generation(s) of customers.

Detailed documentation of table discussion post-its follows:

Megatrends

- "Where do you share common ground with Duke Energy?"
  - "All"
  - "All"
  - "General Agreement"
  - "All, with some more focus on uncertainties"
  - "Generally, acknowledge listed trends but …"
  - Customer Expectations
  - Changing Customer Expectations
  - "Protecting Consumers from Cyber Threats"
  - "Physical Threats"
  - "Threats to Infrastructure"
  - "Cyber threats are real concerns to many customers – including seniors"
  - "Weather Events (incr. Frequency, severity, duration)"
  - "Agree that the grid needs improvement"
  - "Technology Advancement – EV adoption, storage prices"
  - "Environmental Trends"

- "Top 3 Trends: (1) Technology Advancements/Grid Improvements, (2) Environmental, (3) Weather Events (dependent on data). Trends need emphasis"

- "What's missing? Where do you differ?"
  - "Different 'customer of tomorrow'
  - "Aging Line workforce"
  - "Grid reliability and improvement (transmission) is essential for serving a growing state (and growing state industry)"
  - "Missing: Is there an added service such as high-speed internet"
  - "More electric: More connected appliances/homes"
  - "Rate of change is ramping up"
  - "'Electrify Everything' scenario (as another megatrend? – or supplement on technology advancement [in addition to EVs])"
  - "Climate change driving fossil fuel use"
  - "More emphasis on climate"
  - "Enough weight on EV Budgets?"
  - "Declining Load Growth"
  - "Detach from utility (going off grid)"
  - "Flat load growth missing"

Implications of Megatrends

- "Where do you share common ground with Duke Energy?"
  - "All"
  - "Can't stand still and can't go backward (Business as Usual won't work)"
  - "Agree on identification of implications"
  - "How can you break down the language for low-income people in a form to understand better."
  - "How will the company show how, in low-income communities, grid improvement will be used in their home?"

- "What's missing? Where do you differ?"
  - "Big Policy $wings – Impact of corporate tax structure. Hit on customer bills. Climate Δ/energy policy. Deregulation (especially transmission & distribution)"
  - "Disproportionately Impact low income"
  - "Missing: customer affects / behavior modification"
  - "Cost must be considered and remain reasonable"
  - "What does this mean for solar non-utility size (solar) solutions? Rooftop/Community."
  - "How do we integrate NGO solar (DER) solutions into the grid (Interchange)
  - "How much job growth?"
  - "How can low income people participate in job growth?"

- "How can we develop more resilience (security) with storms?"
- "Cost may actually decline – missing: business model"
- "Updated regulatory construct and business model to take advantage of markets"
- "Optimize response to megatrends"
- "How are these weighted?"
- "Unanticipated catastrophic events"
- "But maybe not degree of harm under business as usual (BAU)"
- "Fossil Fuel Environmental and price implications w/ BAU"
- "Does Grid Mod give both NC/SC an economic development advantage?"
- "Disparity on who can own an EV"
- "Load implications of younger generation"
- "Equity w/respect to rates or benefits of service, especially for low income"

Appendix 3: Program Prioritization Method

Full notes: Duke Analytic Process Questions

Description of process: Following the Duke Energy presentation on the company's analytic process for developing the grid improvement plan, stakeholders asked questions in plenary. This section provides a summary of the questions posed by stakeholders to Duke Energy staff, and notes from staff's real-time responses.

- "How do you calculate the environmental benefits – using [data or reports from the] EPA or some other data?"
  - For self-optimizing grid, we tried to quantify benefits from additional capacity to address peak shaving. Another environmental benefit is the enablement of future DER capacity like rooftop solar and EVs. These technologies have a range of potential adoption penetration and growth, and also range in resources required to prepare for that. We used an external consultant to help with these estimations.
- "We would love to see more detail on the environmental benefits analysis."
  - The company makes assumptions around inputs such as how much EVs and battery storage are going to grow—we can share these assumptions and we are open to feedback.
- "For the net present value calculation, what discount rate was used?"
  - We used the appropriate company discount rate for the service territory, approximately 7%. We've seen other cost benefit analysis which didn't use our rate; however, we felt it would be more conservative to use our rate.
- "Can you provide more info on the ICE model [and how it is used to quantify the] value of lost service, and whether this is a proprietary methodology?
  - ICE is not a proprietary model. It is based on a DOE-sponsored study to analyze typical costs of service interruptions for various customers including residential, small commercial, and large industrial. The model

assigns an average for momentary interruptions and different lengths of hours, and we've seen it is the best tool available to value what "being without power" really means.
    - The ICE model does not take into account outages longer than 16 hours, so it does not give you the value of major events like hurricanes. That is a whole different analysis that the ICE tool is not designed for.
- "With these examples, it seems that a lot of benefits flow to commercial customers. How are you going to allocate costs to ensure they pay? As a second question, for Targeted Undergrounding, how are you differentiating between maintain TUG [programs] and grid mod TUG [programs]?
    - The TUG programs address several of the megatrends. Based on stakeholder feedback to the initial plan, we have scaled back the amount of TUG and focused the current plan on individual projects.
    - Using these initial individual projects, we plan to prove the value of TUG and how it addresses megatrends...and then complete more projects more based on this value.
    - For the question on how costs are allocated, we looked at programs that address momentary interruptions. This TUG project was unusual because of the number of commercial customers near a line also serving residential customers.
- "For the cost/benefit of targeted undergrounding, are you also considering how to enable a microgrid to [be integrated into those geographies]?"
    - There is a lot of opportunity to use storage in ways we haven't used it before. The important focus for Duke Energy is to have a positive net present value for storage, e.g., it meets a capacity need or a need to address a community that is underserved.
    - Then, once you have the storage, you can use it to island or microgrid during peak demand, or support frequency variation. But the core value is deferring investment.
- "How do you handle the differences between customer and utility benefits when calculating net present value? "
    - All costs eventually go to the customer — savings for the utility goes to the customer in the end, so it's beneficial if the utility saves.
    - Regarding direct customer benefits around the self-optimizing grid, in addition to going around outages, the program also enables two-way power flow through automated switches controlled by a central hub that allows us to change configurations and manage more DER on the system.

Appendix 4: Q4 Filing Overview

Q&A:

Following the Duke Energy overview presentation on the company's proposed near final fourth quarter filing for grid improvements, company staff took questions in plenary from participants. This section provides a summary of the questions posed by stakeholders to Duke Energy staff, and notes from staff's real-time responses.

- "For the heat map showing reduced ability to meeting customer expectations, what is going on with the orange in the middle?"
    - The orange reflects uncertainty around factors like EVs and batteries, and around expectations about the adoption of these new technologies. In the near term future we aren't sure how these will be immediately managed, but in the long run we are confident we can support these technologies (reflected by the green shown further out in time in the heat map).
- "With regards to the Implication titled "reduced ability to connect DER," the improvement plan is better than BAU but still seems like a slow demise.[...] What is the plan missing that would enable it to [actually improve]?"
    - The lighter shade of yellow reflects uncertainty from and around addressing impacts "in the most cost-effective way."
    - This includes uncertainty around technologies like electric cars or batteries.
- "What's going on with the increased disparity between customers on the bottom [heat map]?"
    - The traditional utility model is to serve the most load, which in the case of South Carolina would imply investing more in urban areas, and less in rural. If we can deploy some electronics on the rural lines to reduce outages, this would ease the disparity between the self-optimizing urban grid and the rural service.
- "Costs are a dire picture under business as usual. With grid improvement, are you predicting costs will eventually be lower, and will this correlate to a decrease in rates?"
    - Yes, over the base case. When these programs kick in they will create relative value, resulting in a decrease in rates compared to business as usual. IVVC is a great example in the short term; by better managing the voltage, we will help lower costs to customers.
    - It's more effective to do something proactively and well planned than reactively when the system has reached a breaking point.
    - For any of these programs, are we going to see bill returns? We think so. We've erred on the more conservative side of capturing only the benefits to hard costs; we have not included valuation of holistic benefits..

- "Is this plan [being created under existing planning processes and methods for grid improvement relative to integrated resource planning] or would a new process be developed integrated planning?"
    - We are looking at planning as both an enterprise process and as a system, so it could be used across jurisdictions.
    - A phased approach will be used for a few principle things like software, analytics, and integration of that into the global plan for the utility.
    - We continue to reach out for best practices, stakeholder engagement, and lessons learned.
- "Do you have any more insight on hosting capacity?"
    - We have discussed hosting capacity in North Carolina, which takes over a year or two or work to do correctly. We are working with a new software package that will help us work on hosting capacity more efficiently than we are today.
    - We are aiming to focus on solving for enterprise level infrastructure and functionality.

Polling Questions

Several stakeholders offered to provide an explanation to the plenary on where they placed their cursor on the real-time polling question about overall alignment with the filing plan, and why:

- 75%: One stakeholder was uncertain investments in grid improvement will actually create opportunities for DER and skepticism on how the investments lead to future decreased costs.
- 50%: Another stakeholder was unsure the implications of the grid improvement plan on rates and total revenue requirement, which customers will pay. Without knowing this, this individual found it hard to say, 'Thumbs up.'
- 50%: This stakeholder stated that uncertainty in costs make it difficult to fully support the plan.
- 75%: One stakeholder stated this plan is better than the original version that was introduced in North Carolina, but there is some remaining skepticism around if certain programs fit as grid modernization.
- 75%: Another stakeholder is supportive of setting the foundation for and building data analytics capability for future DER integration.
- 60%: This stakeholder stated that grid improvement is necessary, but it's still unclear how the plan will result in benefits and costs. Additionally: we need a diversified approach to solving the energy problems in South Carolina, balanced with the need for renewables and energy efficiency. We also need to be investing in other things as well — this is a lot of money that could be supporting other efforts.

Table Discussions

Participants were asked to discuss and document "What are the strengths of this plan? What issues, concerns, or questions do you need to raise?" For this activity, RMI tasked Duke Energy representatives with documenting what they heard from stakeholders on post it notes.

Report out in plenary:

Three tables presented out on the highlights of their discussion

1. Table 1: Participants felt that Duke Energy had focused on listening to stakeholder feedback during the revision process for the grid improvement filing plan. Specifically, stakeholders appreciated the inclusion of more storage, ability to accommodate increased renewables, and the focus on a self-optimizing grid. Their main issues and concerns focused on the unknown costs and rate impacts, along with an interest in learning more about how the plan would impact the transmission system in addition to the distribution system.
2. Table 2: Participants were also observed that Duke Energy had incorporated stakeholder feedback into the plan and identified the use of a neutral third party facilitator as a positive element of the input process. Concerns focused on cost impacts and opportunities for workforce development. Participants expressed an interest to better understand the difference between the first and second version of the filing plan, and specifically queried why IVVC didn't seem to be included in the first plan.
3. Table 3: The following aspects of the plan resonated as positive among this group: flexibility in design of the plan, reduced undergrounding investments, and improved cost-benefit analysis and report out. Some participants expressed they view DER as an opportunity rather than a threat. Concerns focused on costs, metrics and goals for DER integration, and their desire for planning to focus more on decentralized generation.

The follow section captures digitally the detailed notes from Duke Energy staff at discussion tables:

What are the strengths of this plan?

- Stakeholder involvement and listening/responding
- Self-optimizing grid
- Outage updates via text
- DER dispatch tool
- Battery storage is starting to show up in grid plan
- Accommodates small solar and battery
- Starting to capture costs experienced by customers
- Refreshing to hear ability to deal with DER being taken into consideration
- More EVs and storage

- Reliability improvement is key component
- Refreshing to hear stakeholder feedback will be integrated
- Responsiveness of version 1 to feedback
- Big improvement over NC approach
- Stakeholder process with neutral 3rd party expert
- Narrowed focus to relevant trends compared to last time
- Provided good distinction between BAU and GIP with clear options for future
- Stakeholder input reflected
- Flexibility of plan
- 3 years more feasible than 10 years
- More user friendly
- More national views
- Tone more receptive to DER—not painted as a problem but a solution
- Better definition of projects
- Cost benefit by project better than last version
- Scaled back TUG to prove benefit

What issues, concerns, or questions do you need to raise?

- Why wasn't IVVC in the original plan?
- What are the differences between the first and second plans?
- Important to lay out as much of the future plan as possible
- Important to communicate how these investments facilitate efficiency and behavior decisions
- Re: 44 kV lines where? How? When?
- Not much info on cost stabilization over time
- Want more info on workforce development plans
- Want more info on future assumptions related to solar penetration
- Want more info on which programs contribute to which grid capabilities
- How long will this investment and cost increase last? Not clear
- Looking for how costs and budget will be allocated, i.e., EV vs. transmission
- Generation planning: need less centralized generation, impacts to IRP
- IRP not showing retirements related to grid improvements
- Securitization for stranded assets: effective, efficient retirement of assets
- Making the most of the potential—Biggest DER is EE, may not need grid improvement for leveraging EE, what's the true customer value?
- Cost allocation
- Implementation execution risk
- More project by project details
- Cost overruns and timelines lengthening
- More info on macro view of megatrends vs. individual trends
- Opportunities to mitigate rate impacts to low income needs more discussion
- More definition around how stakeholder process continues over 10-year life of plan

- Metrics and goals for DER integration
- Does grid mod improvement provide "perfect power" or markedly improved at plant site?
- Integrated VAR level with Grid Mod—does this help at plant level and can plant be relieved of their VAR control?
- Are there synergies with customer and utility? Customer operating characteristics paired with utility costs
- Rate impact TBD
- Need more info on transmission (not just distribution)
- Need more on hardening the transmission system
- Transmission capacity impacting economic development
- Reliability not as big an issue for some groups, varies by types of customer class (e.g., hospitals)
- Aligning who pays for benefit
- Cost and who pays?
- Need to capture customer outage costs greater than 16 hours
- Need to plug into non-profit groups as partners and education
- More community involvement to understand benefits

Stakeholder Engagement Process

Docket No. 2019-182-E

Net Energy Metering Stakeholder Meeting

March 12, 2020, 10:00 am – 1:00 pm
1201 Main Street, 3rd Floor Conference Room, Columbia, SC
or Remotely via GlobalMeet

Click this Link to Join Webinar
Dial-in: (712) 770.4203; Participant Code: 285616

Agenda:

10:00 – 10:15
Safety Briefing – Jacob Colley
Introductions – Round Table
Ground Rules – Leigh Ford

10:15 – 10:30
Overview of Act 62 and NEM – Ashley Cooper
Overview of Stakeholder Process – Thad Culley and Leigh Ford

10:30 – 12:15
Utilities Presentations and Q&A
Long-run Marginal Costs, Cost of Service implications of customer-generators

10:30 – 11:15 – Duke Energy and Q&A
Presenters: George Brown, General Manager of Distributed Energy Technology, Policy, and Strategic Investment
Lon Huber, Vice President, Rate Design and Strategic Solutions

11:15 – 11:30
Break

11:30 – 12:00
Stakeholder Presentations
Cost of Service implications of customer-generators and Q&A
Presenters: Thad Culley, Regional Director, Vote Solar

12:00 – 12:30
Utilities Presentations and Q&A
T&D Planning

Duke Energy and Q&A
Presenters: Mark Oliver, Managing Director Integrated System Planning

12:30 – 1:00
Wrap Up and Next Steps

Meeting Location:
1201 Main Street
3rd floor Conference room
Columbia, SC 29201.

Public parking is available in the garage adjacent to the building. Entrance to the parking garage is located on Lady Street.

Contact Info:
Leigh Ford
803-528-5598
Leigh.ford@duke-energy.com

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Net Energy Metering Stakeholder Meeting
March 12, 2020, 10:00 am – 1:00 pm
1201 Main Street, 3rd Floor Conference Room, Columbia, SC
or Remotely via GlobalMeet

Welcome:
Leigh Ford of Duke Energy welcomed stakeholder participants.

Safety Briefing:
Jacob Colley of Duke Energy provided a safety briefing regarding the Corona virus.

Ground Rules:
Leigh Ford explained that the intent of the collaborative is to share ideas and develop the new net metering tariff. General ground rules include:

- Share what's on your mind.
- Be present and challenge assumptions, yours included.
- Focus on our shared interests and set aside differences.
- In order to create an atmosphere of trust and openness, comments by participants, observers, and hosts should be treated as confidential and not repeated in traditional media, social media channels, or in future litigation.

Leigh Ford volunteered to serve as the secretary and the stakeholders agreed.

Overview of Act 62 and NEM:
Ashley Cooper of Parker Poe provided an overview of Act 236 and Act 62.

Discussion of whether Act 236 terminates or sunset after 10 years.

Overview of Stakeholder Process:
Thad Culley of Vote Solar discussed the successful passage of Act 62 and how we hope to use the stakeholder process to develop a successor tariff that's just and reasonable in light of benefits while determining the proper methodology. He discussed what's been considered in other states and South Carolina leveraging the what's been done around the country.

Leigh Ford addressed the proposed timeline leading up to the PSC's requirement that a new solar choice metering tariff be in place by June 1 of 2021. Due to billing system updates, Duke would like to have an Order by end of 2020 or the beginning of 2021.

Stakeholder Timeline:

- 3/12/2020 – Stakeholder Meeting #1
- 4/23/2020 – Stakeholder Meeting #2
- 6/1/2021 – Solar Choice Metering Tariff in effect

Duke Timeline:

- May 2020 – Negotiations Begin
- July 2020 – Duke files new Solar Choice Metering Tariff
- December 2020 – Duke Order Issued

Mark Furtick of Dominion Energy SC: Dominion has more leeway on their timing. Due to existing regulatory proceedings and their merger, their timeline will be 2- 3 months behind Duke.

Discussion of Duke's progress on its Customer Connect.

Duke Energy Presentation - Long-run Marginal Costs, Cost of Service implications of customer-generators
Presenters:
George Brown, General Manager of Distributed Energy Technology, Policy, and Strategic Investment
Lon Huber, Vice President, Rate Design and Strategic Solutions

Lon Huber introduced himself and described his experience throughout the country, specifically his work on net metering reform. Lon provided a residential rate design overview and presented data from Duke's actual solar customers.

Discussion on rate design, cost recovery, and data provided by Duke.

George Brown spoke about the value of solar framework and how to build out benefits and costs stacks in making that calculation.

Stakeholder Presentation – Cost of Service implications of customer-generators
Presenter: Thad Culley, Regional Director, Vote Solar

Thad from Vote Solar presented on cost of service studies and methodologies and provided examples of other states that have recently revised their NEM framework.

Lon Huber noted that California's design was intentional because of the policy structure in California to have higher use customers fund policy initiatives in the state.

Discussion on what integrated COS might look like in near term or long term.

Duke Energy Presentation – T&D Planning
Presenters: Mark Oliver, Managing Director Integrated System Planning

Mark Oliver presented on Duke's Integrated Systems & Operations Planning process. There is an ISOP workshop scheduled for April 27 in Columbia but this may change. Information on Duke's ISOP can be found at the Company's portal: https://www.duke-energy.com/our-company/isop

Discussion on valuation and the availability of detailed DER data.

Wrap Up and Next Steps
Leigh Ford will send the group the slides and meeting minutes. If there are any additions to the stakeholder participants, please notify Leigh. If you need to sign an NDA with Duke contact Heather Shirley Smith, Ashley Cooper, or Leigh Ford. If you need to sign an NDA with Dominion contact Mark Furtick or Kelly Arms.

The next NEM stakeholder meeting will take place April 23.

Attendees:

Attendee		Organization
Kelly	Arms	Dominion Energy SC
Andrew	Bateman	ORS
Sharad	Bharadwaj	E3
Kullen	Boling	Central Electric Power Cooperative
Robert	Branton	Santee Cooper
Daniel	Brookshire	NC Sustainable Energy Association
George	Brown	Duke Energy
John	Calhoun	Santee Cooper
Steve	Chriss	Walmart
Sarah	Cohen	SC Chamber of Commerce
Jacob	Colley	Duke Energy
Ashley	Cooper	Parker Poe
Thad	Culley	Vote Solar
Tom	Delello	Gregory Electric
Scott	Elliott	SC Energy Users Committee
Leigh	Ford	Duke Energy
Mark	Furtick	Dominion Energy SC
Tyson	Grinstead	Sunrun
Carrie	Grundmann	Walmart
Dawn	Hipp	ORS
Brian	Horii	E3
Lon	Huber	Duke Energy
Maia	Hutt	Southern Environmental Law Center
Bryan	Jacob	Southern Alliance for Clean Energy
Robert	Lawyer	ORS
Jason	Martin	Duke Energy
Lyndsey	McNeely	Duke Energy
Eddy	Moore	SC Coastal Conservation League
O'Neil	Morgan	ORS
David	Neal	Southern Environmental Law Center
Mark	Oliver	Duke Energy
Justin	Orkney	Duke Energy
Lisa	Perry	Walmart
Marcus	Preston	Duke Energy
Cole	Price	Central Electric Power Cooperative
Shelley	Robbins	Upstate Forever
John	Rouff	AARP
Michael	Seaman-Huynh	ORS
Heather	Shirley Smith	Duke Energy
Ben	Smith	NC Sustainable Energy Association
Neal	Williams	Lockhart Power
Bruce	Wood	Sunstore

Welcome!

Net Energy Metering Stakeholder Meeting
March 12, 2020, 10:00 am – 1:30 pm

DUKE ENERGY®

Safety Moment

Jacob Colley, DET Stakeholder Engagement Manager

Safety Moment – Recommended Precautions for Patient Caregiving (CDC.gov)

- Make sure that you understand and can help the patient follow their healthcare provider's instructions for medication(s) and care.
- Help with basic needs – e.g. getting groceries, prescriptions, etc.
- Monitor the patient's symptoms.
- Household members should be separated from the patient as much as possible – e.g. use a separate bedroom and bathroom, if available.
- Prohibit non-essential visitors
- Do not allow pets or other animals to be handled
- Make sure that shared spaces in the home have good air flow, such as by an air conditioner or an opened window.
- Perform hand hygiene frequently - wash your hands often and always thoroughly
- Avoid touching your eyes, nose, and mouth with unwashed hands.

Safety Moment – Recommended Precautions for Patient Caregiving (CDC.gov)

- The patient should wear a facemask when around other people.
  - Wear a disposable facemask and gloves when you touch or have contact with the patient's body fluids
  - First remove and dispose of gloves, then, immediately clean your hands with soap and water or alcohol-based hand sanitizer.
  - Next, remove and dispose of facemask, and immediately clean your hands again with soap and water or alcohol-based hand sanitizer.
  - Place all used disposable gloves, facemasks, and other contaminated items in a lined container before disposing of them with other household waste.
- Avoid sharing household items with the patient – dinnerware, napkins, quilts/throws, etc.
- Clean all "high-touch" surfaces, such as counters, doorknobs, phones, tablet, etc. daily
- Wash laundry thoroughly.
- Discuss any additional questions with your state or local health department or healthcare provider.

Act 62
Solar Choice Stakeholder Meeting 1

NEM under Act 236

Any and all costs prudently incurred pursuant to the provisions of this chapter by an electrical utility as approved by the commission and any and all commission approved benefits conferred by a customer-generator shall be recoverable by each entity respectively in the electrical utility's rates in accordance with these provisions:

- (1) The electrical utility's general rates, tariffs, and any additional monthly charges or credits, in addition to any other charges or credits authorized by law, to recover the costs and confer the benefits of net energy metering shall include such measures necessary to ensure that the electrical utility recovers its cost of providing electrical service to customer-generators and customers who are not customer-generators.

- (2) Any charges or credits prescribed in item (1), and the terms and conditions under which they may be assessed shall be in accordance with a methodology established through the proceeding described in item (4). The methodology shall be supported by an analysis and calculation of the relative benefits and costs of customer generation to the electrical utility, the customer-generators, and those customers of the electrical utility that are not customer-generators.

- (3) Upon approval of the methodology provided for in item (4), each electrical utility shall file its analysis of the net cost to serve customer-generators using the approved methodology and shall propose new net energy metering rates.

- (6) In the event that the commission determines that future benefits from net energy metering are properly reflected in net metering rates because they provide quantifiable benefits to the utility system, its customers, or both, and to the degree such benefits are not then being recovered by the electrical utility in its base rates, then such future benefits shall be deemed an avoided cost and shall be recoverable pursuant to Section 58-27-865 by the electrical utility as an incremental cost of the distributed energy resource program.

Solar Choice under Act 62

Solar Choice is an NEM program that (i) arises from Act 62 and (ii) was not specifically contemplated by Act 236. As such, S.C. Code Ann. § 58-40-20(F)(3), as implemented by Act 62, addresses the tariff methodology for this new NEM program:

- A solar choice metering tariff shall include a methodology to compensate customer-generators for the benefits provided by their generation to the power system. In determining the appropriate billing mechanism and energy measurement interval, the commission shall consider:
  - (a) current metering capability and the cost of upgrading hardware and billing systems to accomplish the provisions of the tariff;
  - (b) the interaction of the tariff with time-variant rate schedules available to customer-generators and whether different measurement intervals are justified for customer-generators taking service on a time-variant rate schedule;
  - (c) whether additional mitigation measures are warranted to transition existing customer-generators; and
  - (d) any other information the commission deems relevant.

Restrictions on value of solar in Act 62

S.C. Code Ann. §§ 58-40-20(A)(3), 58-40-20(G)(1), and 58-40-20(I), each as amended by Act 62, work in conjunction to prohibit (under the new tariffs):

(i) recovering "lost revenues" for net metering in the manner formerly allowed by Act 236;

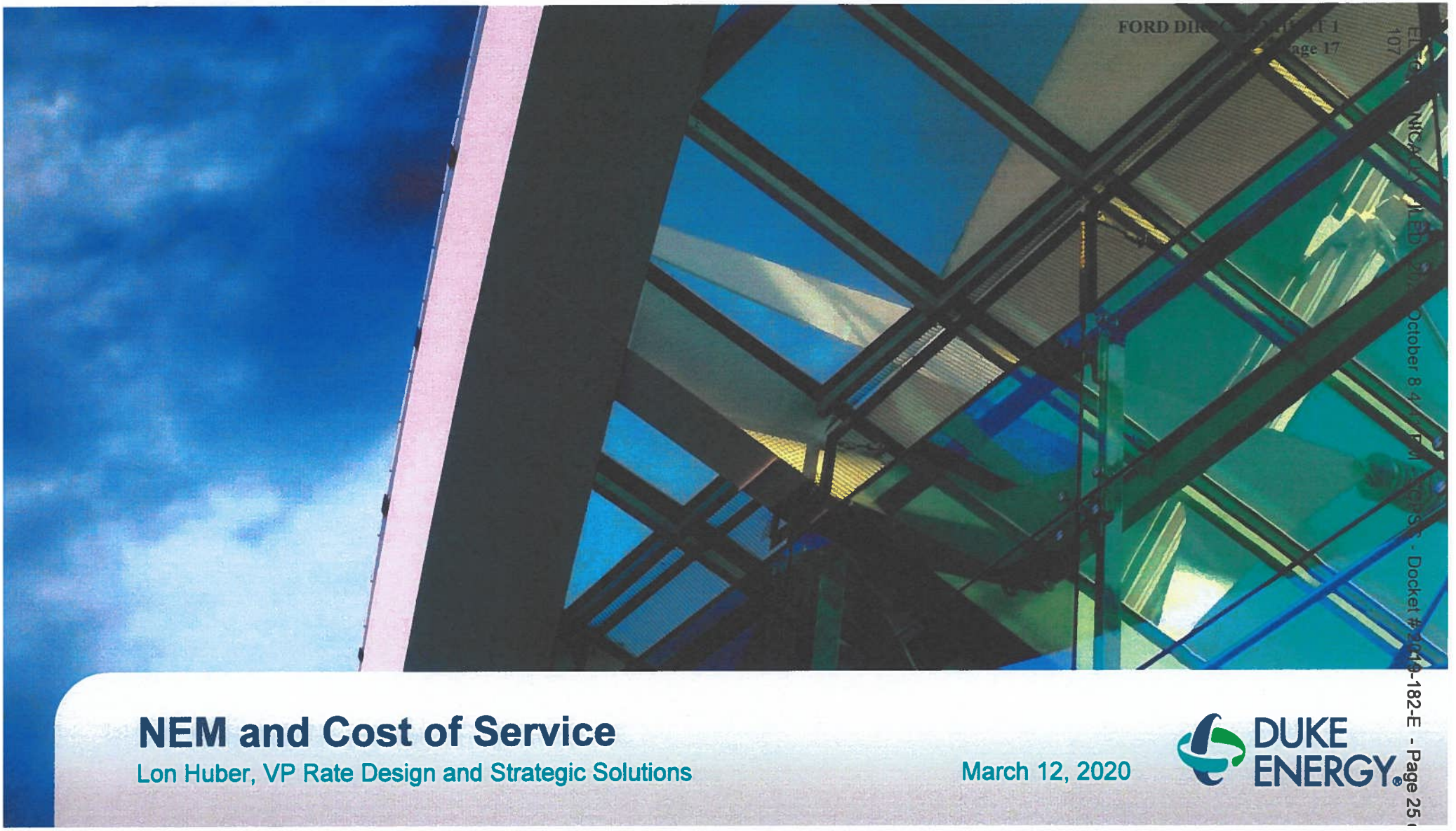
(ii) cost-shift associated with [Solar Choice] to the greatest extent practicable; and

(iii) subsidization associated with [Solar Choice] to the greatest extent practicable.

Recovery under Act 62

In contrast to Act 236, Act 62 does not expressly address cost recovery for NEM programs. Rather, Act 62 indicates that:

> (I) Nothing in this section, however, prohibits an electrical utility from continuing to recover distributed energy resource program costs in the manner and amount approved by Commission Order No. 2015-194 for customer-generators applying before June 1, 2021. Such recovery shall remain in place until full cost recovery is realized. Electrical utilities are prohibited from recovering lost revenues associated with customer-generators who apply for customer-generator programs on or after June 1, 2021.



NEM and Cost of Service

Lon Huber, VP Rate Design and Strategic Solutions

March 12, 2020

DUKE ENERGY®

Agenda

- Residential Rate Design
- Act 62 Requirements
- Data on Customer Generators in SC
- Legacy Value of Solar Framework

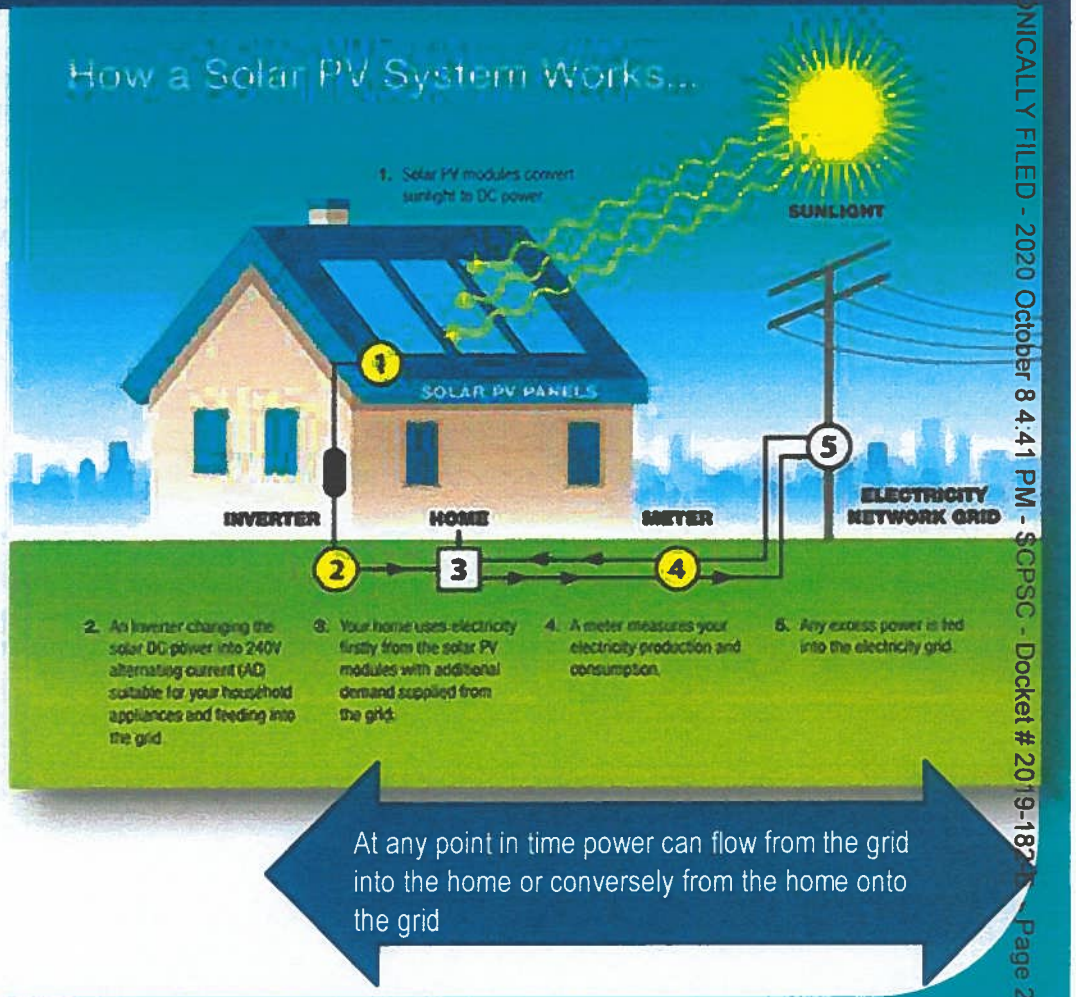
Residential Rate Design - How do Utilities Recover Their Costs?

Duke Energy Carolinas (DEC)

Duke Energy Progress (DEP)

Balancing the System in Real Time

- System operators match generation to demand in real time on a minute-to-minute and hour-to-hour basis.
- In any given minute or hour an NEM customer may be consuming power from the grid if their solar rooftop system is not producing enough power for their home's needs.
- Conversely, in any given minute or hour, the rooftop system may be producing more power than needed at the home resulting in exports of power to the grid.
- Does the current NEM framework accurately price the cost to serve customers and pay customers the marginal value of the excess power?

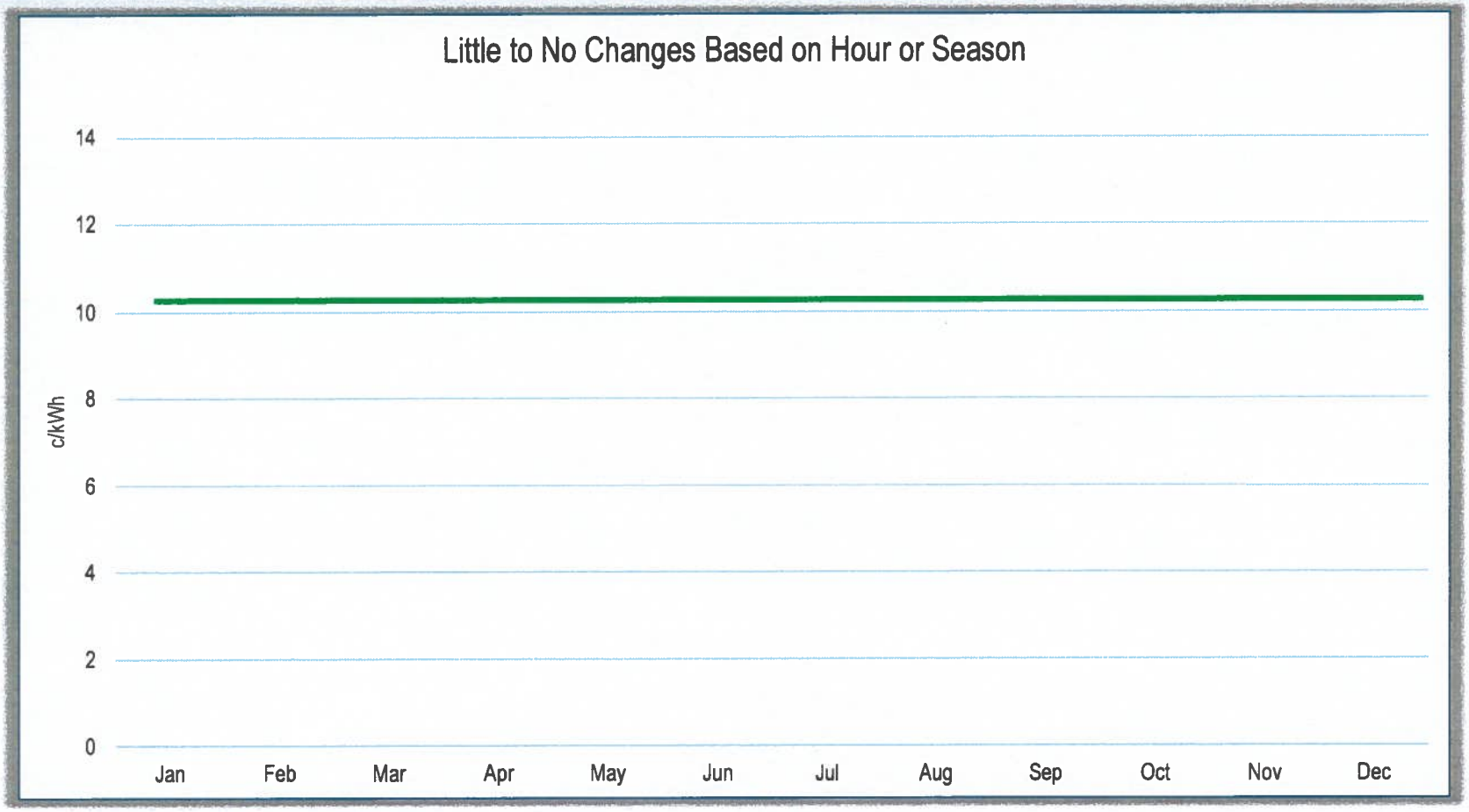


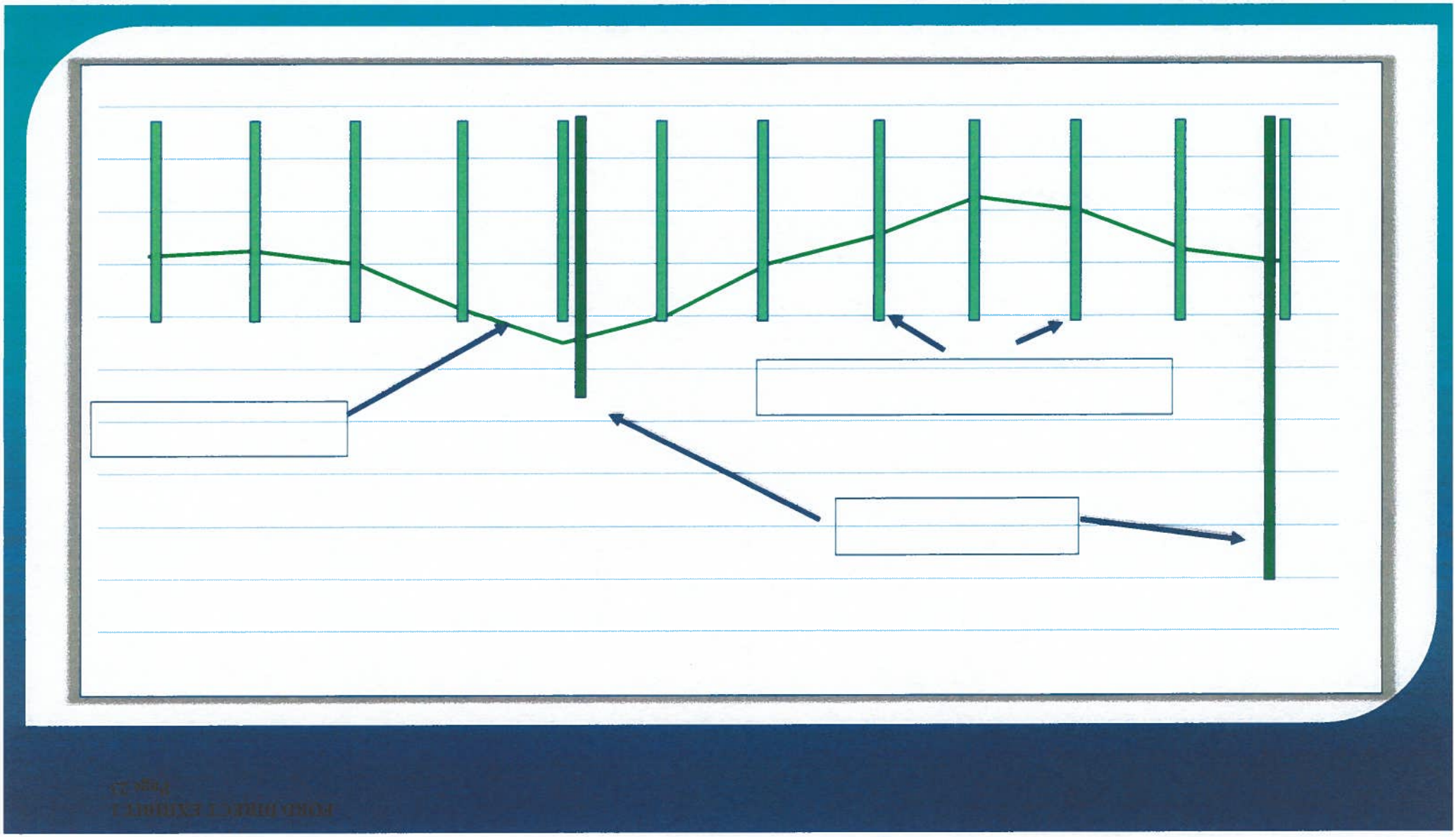
https://phoenixsolarpower.com.au/pv-systems/grid-connect.html

Cost Classifications

- Energy
  - Unit: kWh
  - Examples: fuel, purchased power, emissions
  - ~20% of residential costs in DEC, ~35% of costs in DEP
- Customer
  - Unit: per customer
  - Examples: cost of connection and minimum distribution, billing, customer support
  - ~20% of residential costs in both DEC and DEP (SC)
- Demand (Capacity)
  - Unit: kW
  - Comprised of production/generation, transmission, and distribution
  - ~60% of residential costs in DEC, ~45% of costs in DEP
  - "Like maintaining a highway with 100 lanes"
- Industry and company trends point to customer and demand costs increasing as a percentage of total costs

Typical Residential Rate Design…





Cost Recovery Structure Favors NEM Customers

For a Typical DEC-SC NEM Customer Before Adding Solar:

- Energy
  - ~20% of residential cost of service
  - ~90% of revenue through volumetric energy charge
  - Easiest charge to offset through NEM
- Customer
  - ~20% of residential cost of service
  - ~8% of revenue through fixed charge
- Demand (Capacity)
  - ~60% of residential cost of service
  - 0% of revenue through demand charge

Legal Requirements

Act 62 – Cost of Service and Solar Choice Tariff

Legacy NEM Analysis

- "The cost of service implications of customer-generators on other customers . . . including an evaluation of whether customer-generators provide an adequate rate of return to the electric utility . . .[58-40-20(D)(2)]

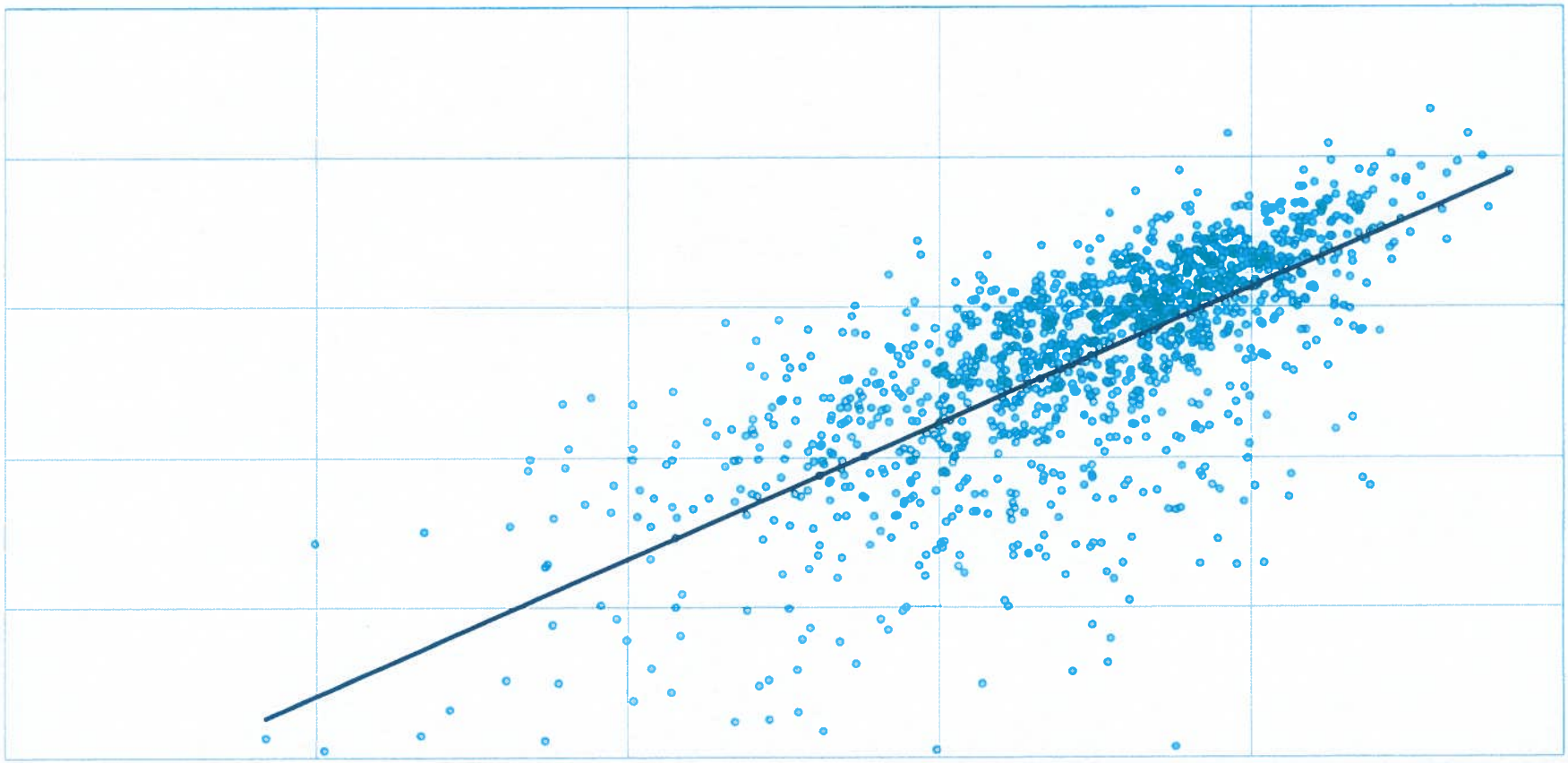
Solar Choice Tariff Requirements

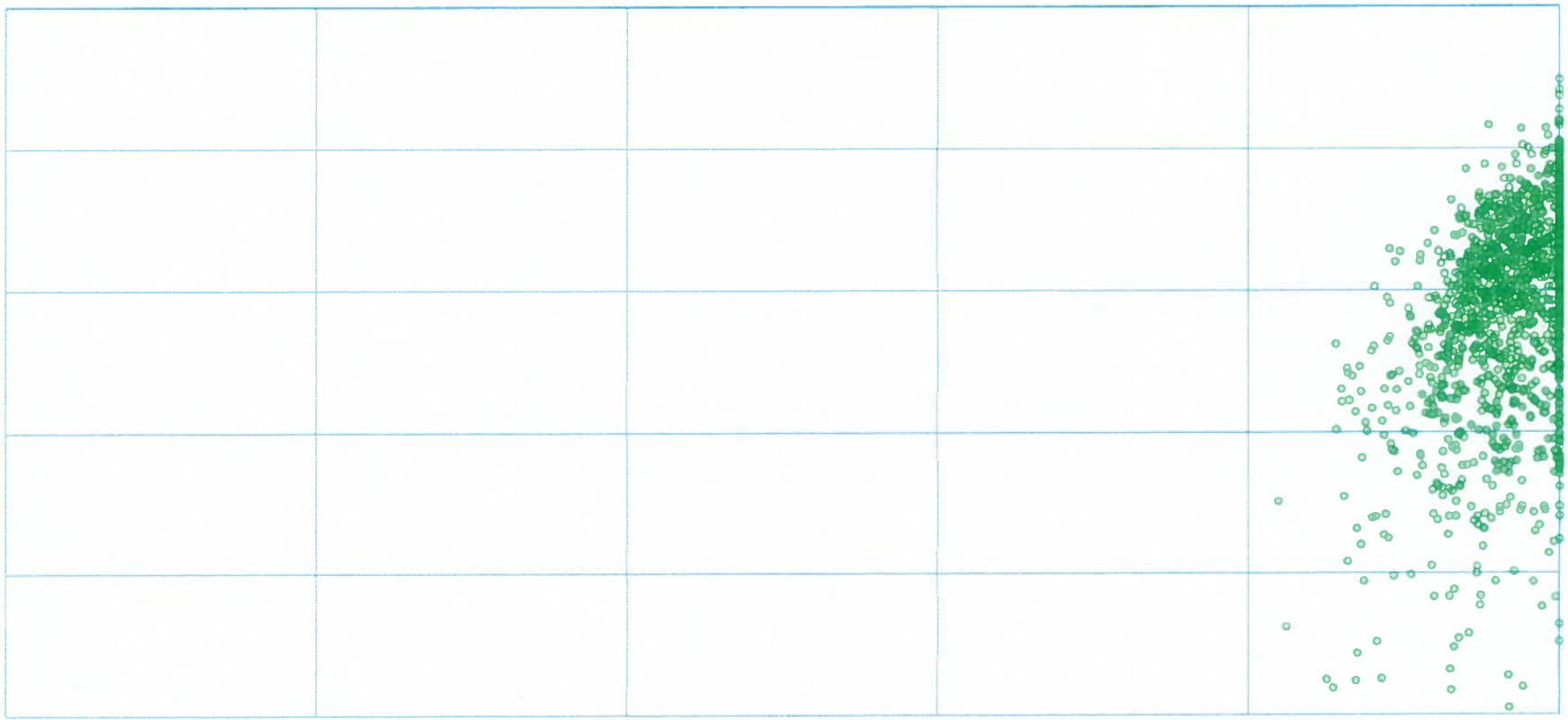
- "Eliminate any cost shift to the greatest extent practicable" . . ."while also ensuring access to customer-generator options for customers" . . . [58-40-20(G)(1)a]
- "Permit solar choice customer-generators to use customer-generated energy behind the meter without penalty" [58-40-20(G)(1)b]

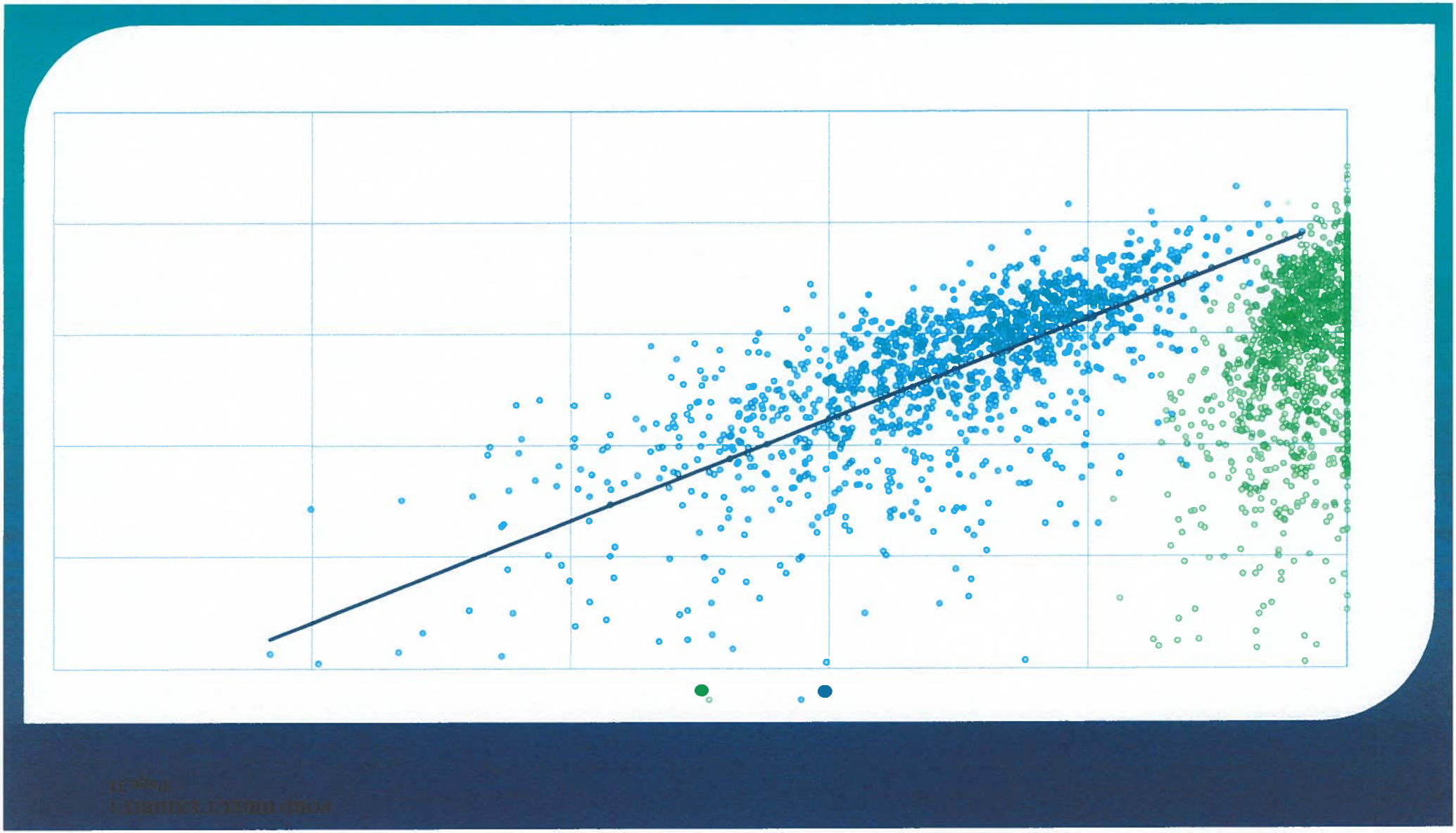
Data on Customer Generators in SC

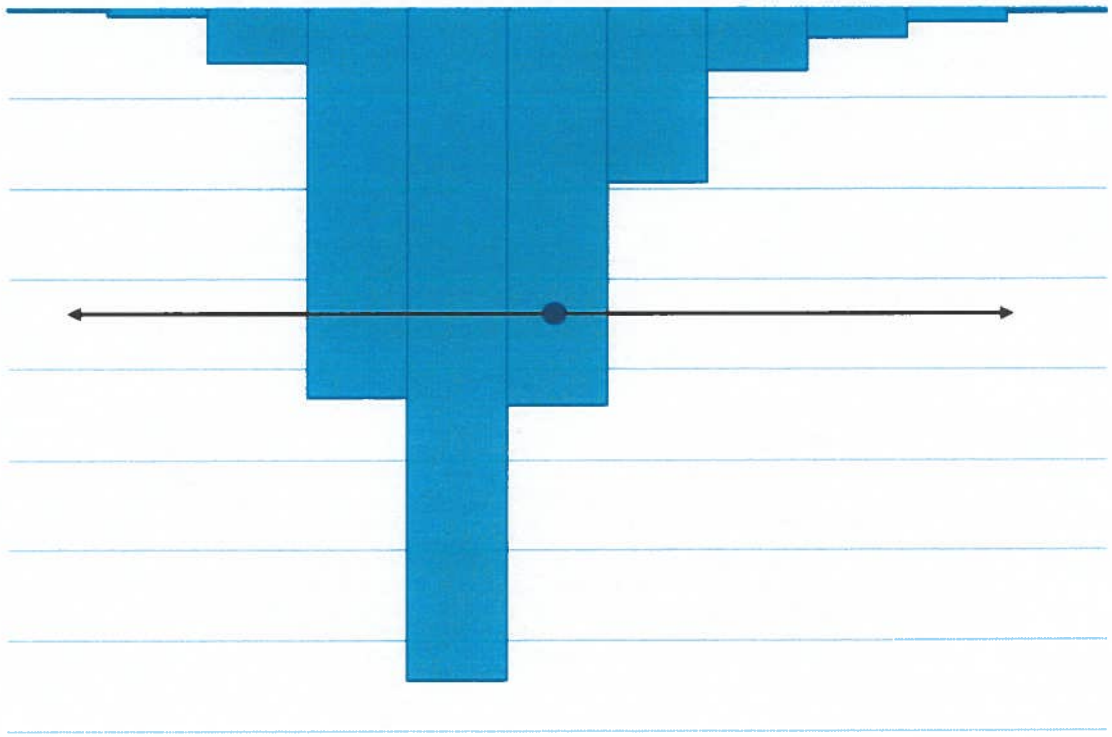
NEM Data Set

- 2019 data from 3,103 customers in DEC-SC
- Utilized subset of 1,300 customers that represents the average system size to load ratio:
  - Data collected for at least 9 months worth of data
- Average Load for Subset: 1,150 kWh
  - Average for residential class in DEC-SC: 1,070 kWh
- Average Solar Generation for subset: 1,035 kWh



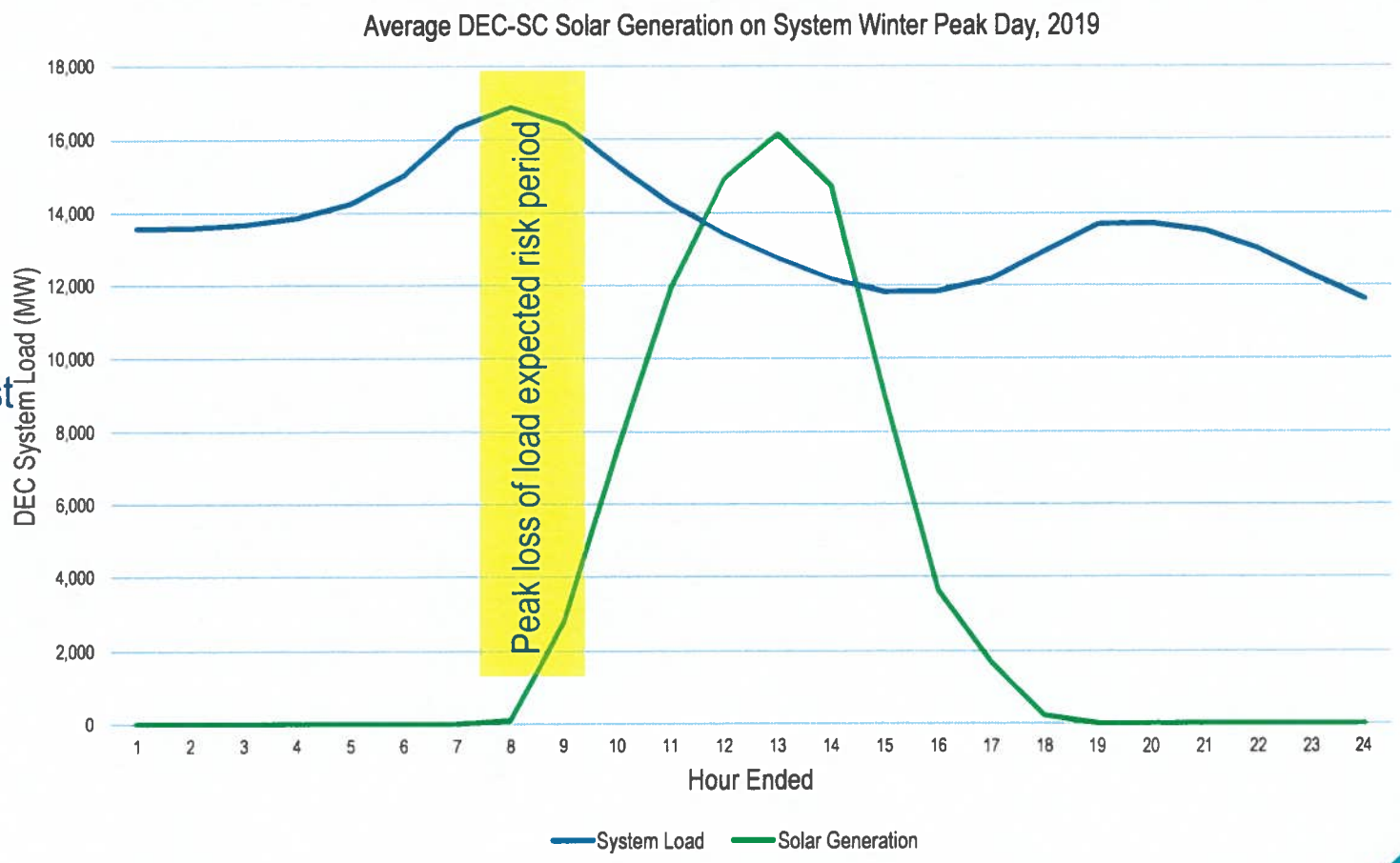






Solar Production is not Coincident with Loss of Load Risk Hours

- ~90% of annual expected loss of load risk for DEC occurs in Winter
- The hours ended 7 through 9 have the highest loss of load risk
- Rooftop solar generation produces little energy during these hours



Legacy Value of Solar Framework

George Brown, General Manager of DET Policy and Strategic Investment

Legacy Structure – Utility Collects Contribution Shortfall

- Estimate the Contribution Shortfall from NEM Solar customers after giving the customer credit for the System Benefits resulting from NEM – two step calculation:
- Step 1: Revenue Gap from the NEM Solar customer equals Average Revenue Without NEM Solar minus Average Revenue with NEM Solar
- Step 2: Contribution Shortfall equals the Revenue Gap minus System Benefits (Value of Solar multiplied by all Solar Production)
- Aggregated Contribution Shortfall (also called the NEM Incentive) is collected from all customers via the Distributed Energy Resource Program

Refinements to Net Metering Framework since Act 236

- Utilize average NEM customer data rather than average residential data
  - Production meters have allowed for the collection of data from actual NEM customers instead of modeled NEM customers
  - NEM customers consume more energy than the average residential customer
- Align with methodology of DSM/EE programs
  - Utilize standard methods across energy resources

Legacy Net Energy Metering ("NEM") Methodology

- +/- Avoided Energy
- +/- Energy Losses/Line Losses
- +/- Avoided Capacity
- +/- Ancillary Services
- +/- Transmission and Distribution ("T&D") Capacity
- +/- Avoided Criteria Pollutants
- +/- Avoided CO_2 Emission Cost
- +/- Fuel Hedge
- +/- Utility Integration & Interconnection Costs
- +/- Utility Administration Costs
- +/- Environmental Costs
- **= Total Value of NEM Distributed Energy Resource**

Cost of Service Study for Customer-Generators in Act 62

VOTE SOLAR

Thad Culley, Regional Director and Regulatory Counsel, Vote Solar

thad@votesolar.org

March 12, NEM Technical Workshop

VOTE SOLAR

§ 58-40-20 (D)(2)

- In evaluating the costs and benefits of the net energy metering program, the commission shall consider:
  - "the cost of service implications of customer-generators on other customers within the same class, including an evaluation of whether customer-generators provide an adequate rate of return to the electrical utility compared to the otherwise applicable rate class when, for analytical purposes only, examined as a separate class within a cost of service study;"

Why include a COSS for evaluating NEM?

VOTE SOLAR

- A cost of service study can provide a relatively standardized perspective on whether net metered customers are paying more or less than what it costs the utility to serve them under a given tariff (and within a specific rate class)
- In Act 62, it is recognized as a necessary component to evaluating the costs and benefits of net metering, but is not solely determinative of whether a subsidy exists or what the successor tariff should be
- A purely wholesale value (value of solar) approach fails to capture the other aspects of a customer-generator that influence the cost to serve and benefit or burden the system (contributions to peak demand, nature and character of use of the system)

What does a COSS tell us about NEM?

VOTE SOLAR

- Do C-G have a unique cost of service when analyzed separately?
- How much revenue do C-Gs contribute toward the cost of service?
- Is there a potential cost shift between customers within a class with and without behind the meter solar?
- Do C-G produce any allocation benefits to the class by reducing contribution to system peaks or other cost drivers?
- How does rate design influence revenue collection?

What doesn't a COSS tell us about NEM?

VOTE SOLAR

- What is the value of solar to the system?
- Conclusive evidence of cross-subsidization? (No!)
- Economic benefits to the state?
- Can solar displace future generation, transmission, or distribution capacity? (not in embedded COSS)
- What are the long-term benefits of solar?

Data needs for a NEM COSS (Examples, not exhaustive)

VOTE SOLAR

- Load research (8760 data) that includes statistically significant number of C-G or interval data from all C-Gs using smart meters
- Interval production data from C-G systems (to match to 8760 load data)
- Program data (customer count, installed capacity, rate of adoption, tilt and azimuth)
- Historic load data (before C-G installed solar) for comparison

Examples from other jurisdictions

VOTE SOLAR

- Utah PSC NEM framework
- Oklahoma Gas & Electric 2015 rate case
- 2013 E3 NEM Evaluation
- New Hampshire NEM 2.0 Docket
- Louisiana PSC Consultant Report

NOTE: Vote Solar does not necessarily endorse any of these approaches as a model and many represent utility litigation positions. These examples are offered here for solely for purposes of discussion and illustrating the range of results.

Utah: PSC Cost-Benefit Framework

VOTE SOLAR

- Utah PSC required by statute to "determine a just and reasonable charge, credit, or ratemaking structure, including new or existing tariffs, in light of the costs and benefits" [of the net metering program].
- PSC rejected $4.25/month NEM facilities charge in 2014 GRC because the record lacked cost-benefit information (statute passed after application filed).
- PSC ordered RMP to undertake load research study on customer-generators and opened a separate docket to explore the determination of costs and benefits.
  - Phase 1: Development of NEM cost-benefit framework
  - Phase 2: Application of framework to determine costs and benefits and to establish a just and reasonable charge, credit or ratemaking structure

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Utah PSC: NEM COS Framework

- Comparative Cost of Service Studies
  - Actual cost of service study (ACOS) based on test year measured loads
  - Counterfactual cost of service study (CFCOS) based on estimated loads w/out NEM
  - Evaluate difference in class revenue requirement and revenue collected, including jurisdictional allocation savings (JAM)
- Shortcomings: single historic test year (embedded COSS); no accounting for future benefits or resource benefits

Utah: Rocky Mountain Power Application

VOTE SOLAR

- RMP argued its COS shows residential C-G only paying 60% of COS, with commercial C-G schedules paying more than the cost of service (109%)
- **Not litigated**; stipulation reached agreeing to retail credit step down, beginning with 92.5% retail credit for exports (*passed through energy balancing account, similar to fuel adjustment*); C-G in transition period remain on tariff for 18 years.
- Future proceeding (now ongoing) will determine export rate, rate design addressed in future GRCs

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OG&E: GRC NEM COSS

- Using 4CP allocation for production and transmission demand, unit costs of DG customers significantly lower than other schedules (DG on mandatory TOU)

Table 2. Comparative Residential Unit Cost Per Customer/Month[39]

	Res-DG	Res-Std	Res-TOU	Res-VPP	Res-CPP
Customer Component	$24.54	$28.64	$26.07	$27.20	$24.57
Energy Component	$0.35	$0.37	$0.45	$0.42	$0.39
Demand-Production	$17.65	$35.19	$38.17	$26.44	$29.71
Demand-Transmission	$5.20	$9.78	$10.69	$7.60	$8.40
Demand-Distribution	$11.03	$13.08	$13.19	$14.37	$11.89
Total	$58.77	$87.06	$88.57	$76.03	$74.96

OG&E: NEM COSS Study

VOTE SOLAR

- Lower cost of service for DG in OG&E territory, combined with other policy features, results in higher relative rate of return than other residential schedules.
- Doesn't include value of surrendered monthly net excess credits (so actually higher)

Table 1. Return on Rate Base for Residential Rate Schedules

	Total Residential Service (Col. 1)	Residential Standard (Col. 2)	Residential TOU (Col. 3)	Residential VPP (Col. 4)	Residential CPP (Col. 5)	Residential DG (Col. 6)
Line 31 (Return on	5.33	5.18	4.89	6.28	6.32	7.23

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E3 2013 NEM Evaluation COSS

- NEM, in the aggregate, meets cost of service
- Results for residential heavily driven by 4-tier rates, (highest tier ~$0.36/kWh, no BFC)
- COSS evaluation conducted as supplement to more traditional cost-benefit analysis

	PG&E		SCE		SDG&E		All IOUs	
	Without DG	With DG	Without DG	With DG	Without DG	With DG	Without DG	With DG
Residential	171%	88%	152%	86%	101%	54%	154%	81%
Non-Residential	128%	106%	110%	105%	124%	122%	122%	112%
Total	146%	99%	122%	100%	119%	111%	133%	103%

New Hampshire NEM 2.0 Docket
NH PUC Docket 2016-576

VOTE SOLAR

- Unitil (one of three utilities) presented NEM COSS results below
- No interval data available for C-G; no C-G included within load research sample
- Results based on approximations, criticized by PUC Staff witness and intervenors for being incomplete

Table 3 Earned Return by Customer Group and Cost Study

	Residential	Solar
Base	-1.48%	-12.27%
Counterfactual	-1.48%	6.08%
Solar Class	-1.46%	-15.55%

VOTE SOLAR

Louisiana PSC NEM Study

Table 34: Solar NEM Customer Contributions to IOU COS (active 2013 Installations Only)

	Annual Per NEM Customer Contributions to COS		Aggregate Annual NEM Contribution to COS		Percent of COS Recovery	
	without NEM	with NEM	without NEM	with NEM	without NEM	with NEM
	($)		($)		(%)	
CLECO	$ 777.59	$ (451.19)	$ 736,376	$ (427,276)	157.7%	66.5%
EGSL	$ 500.59	$ (557.92)	$ 230,269	$ (256,643)	141.8%	53.4%
ELL	$ 411.28	$ (504.31)	$ 929,906	$ (1,140,238)	139.2%	51.9%
SWEPCO	$ 946.83	$ 57.09	$ 608,813	$ 36,710	190.6%	105.5%
Total IOU			**$ 2,505,364**	**$ (1,787,445)**	**157.3%**	**69.3%**

Topics for further conversation

- Are existing COS methodologies sufficient?
- Does DER, AMI, and grid modernization create an opportunity to update cost classifications (energy, demand, customer)

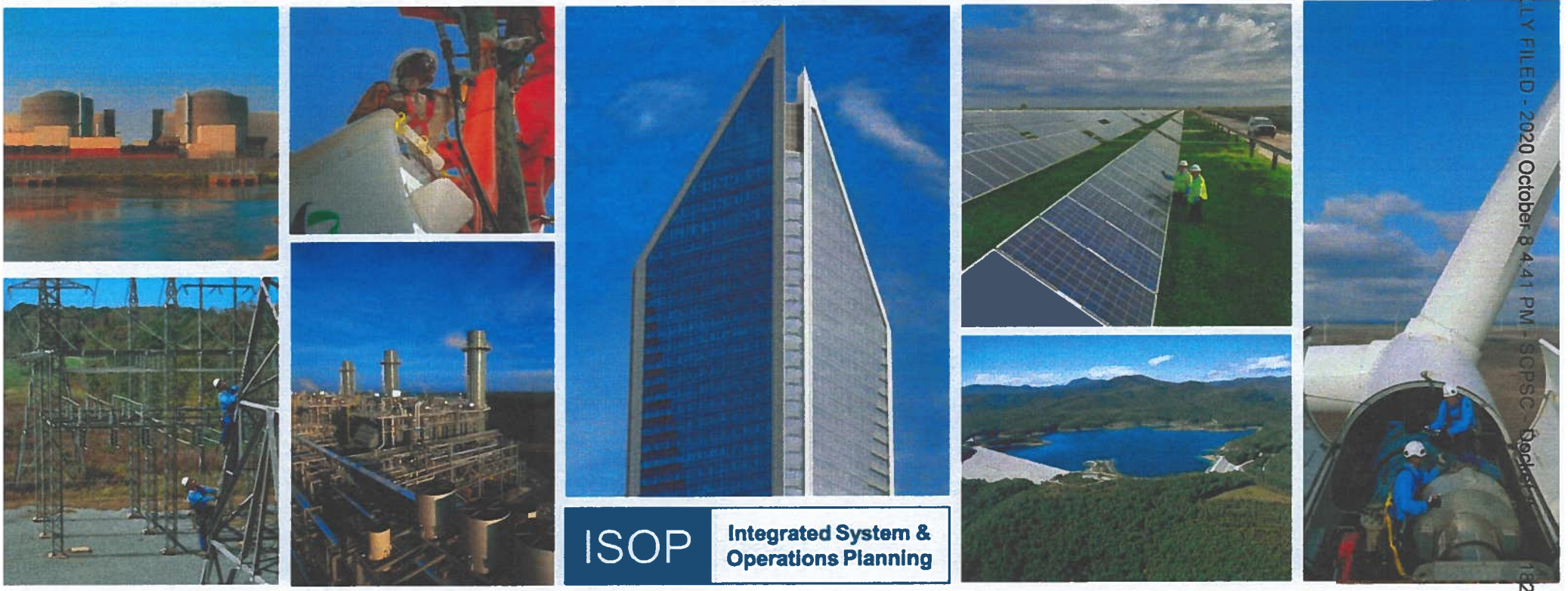
Thank You!

- Thad Culley
- thad@votesolar.org

Integrated System and Operations Planning Discussion

SC NEM Stakeholder Meeting

March 12, 2020



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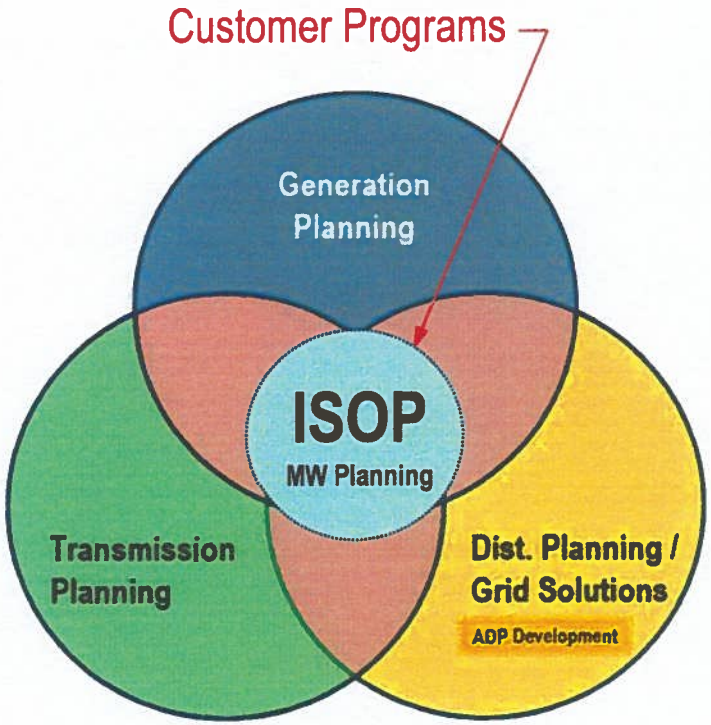
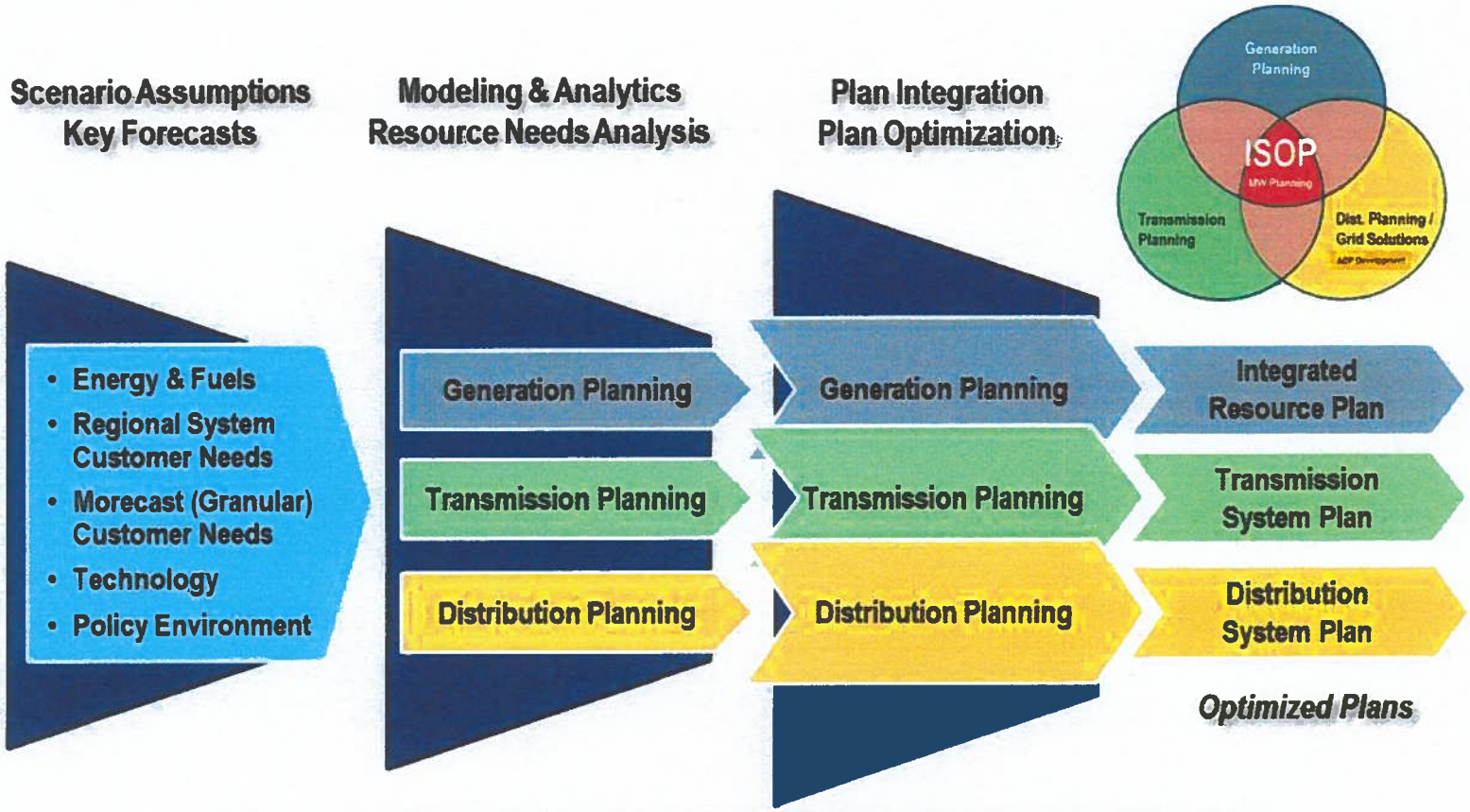
Duke's ISOP Journey

The Integrated System & Operations Planning (ISOP) vision is a planning framework that optimizes capacity and energy resource investments (MW/MWh) across Generation, Transmission, Distribution and Customer Solutions. The framework will address:

- Operationally feasible plans while accommodating rapid renewable growth
- Enhanced modeling to value new technologies such as energy storage, electric vehicles, and intelligent grid controls/customer programs (non-traditional solutions for Distribution and Transmission)
- Ability to evaluate different asset portfolios across a broader range of potential future scenarios

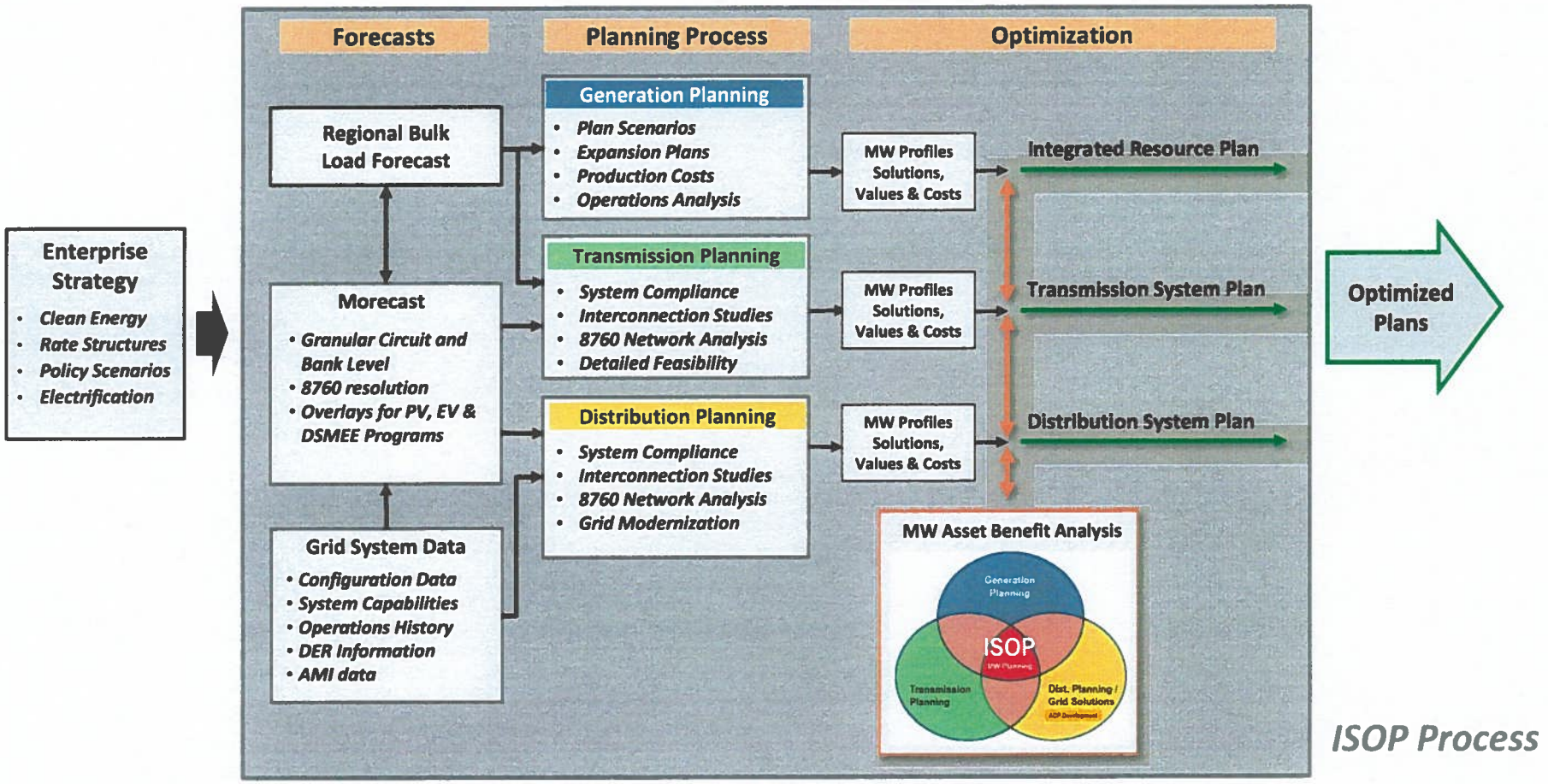


Duke's ISOP Journey



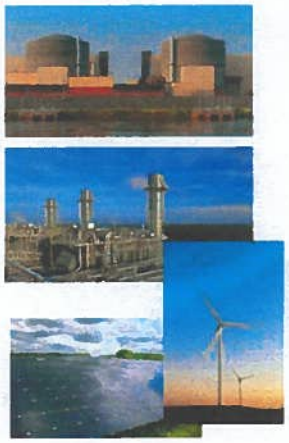
ISOP drives optimization through collaboration and integration

Aligning and Linking Process, Tools and Data



ISOP Process

Expanding the Scope of Scenario Analysis

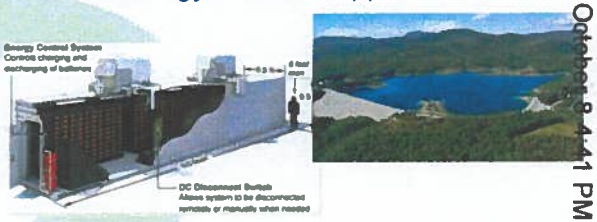


Supply Side

- Assumptions for new generation technologies
- Views of resource mix (central and distributed resources) and reliance on external resources
- Appropriate levels of precision for locating planned resources

NTS/Storage Potential

- Expanding the view for storage needs and potential on the system
- Anticipation of storage operations and use cases for future energy network support



Identify Points at Which Potential Plans Diverge

Demand Side

- Customer requirements and expectations in the future envisioned
- Enhanced assessment of load-modifying resources and programs
- Appropriate approach for location of new resources

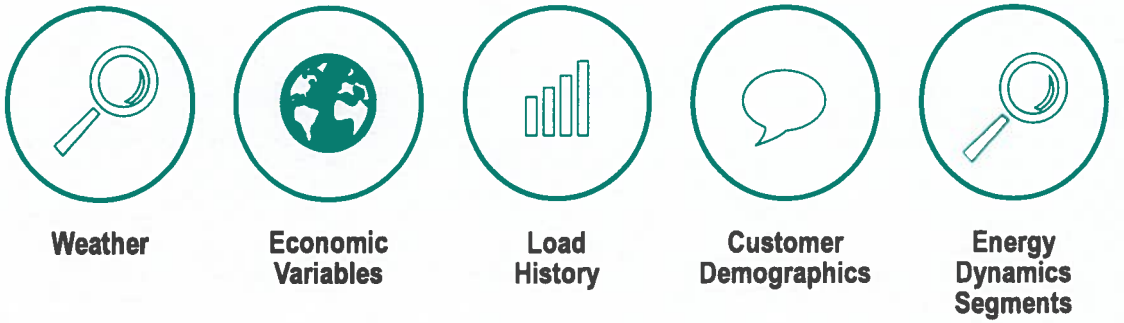
Grid Implications

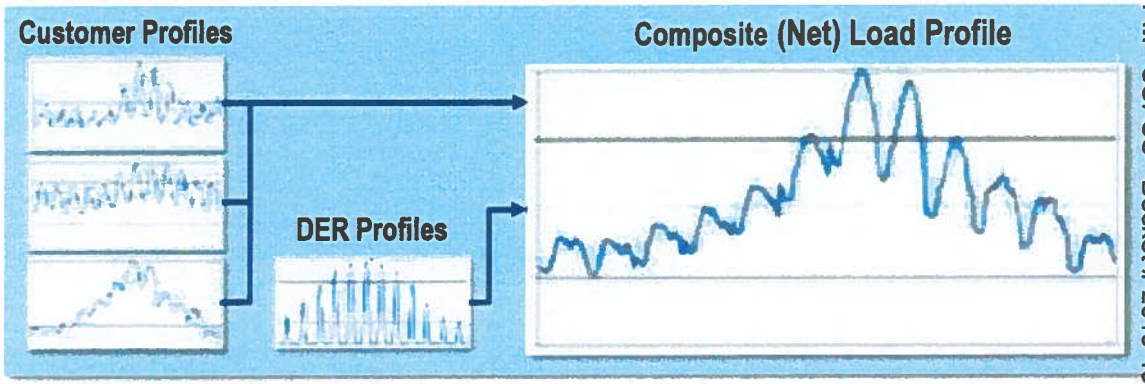
- Informed view of distributed resources and capabilities operating on the system
- Grid configurations and capabilities needed to support envisioned future operations

Granular Load Forecasting

- 10-year hourly load forecasts for each distribution circuit
- Bottom-up feeder-level forecasts inclusive of DERs and EVs (gross and net load)
- Distribution planners can make circuit-level forecast adjustments
- AMI data will be useful as it becomes available to forecasters
- The new tools will support development of forecast scenarios

These are critical new inputs for the advanced distribution planning process





Advanced Distribution Planning (ADP)

Incorporate sophisticated granular load forecasts

- Current 3-5 year window evolving to 10 years
- Forecasting is moving from individual distribution planners to load forecasters collaborating with the planners
- Developing new capabilities for multiple planning scenarios

New power flow demands

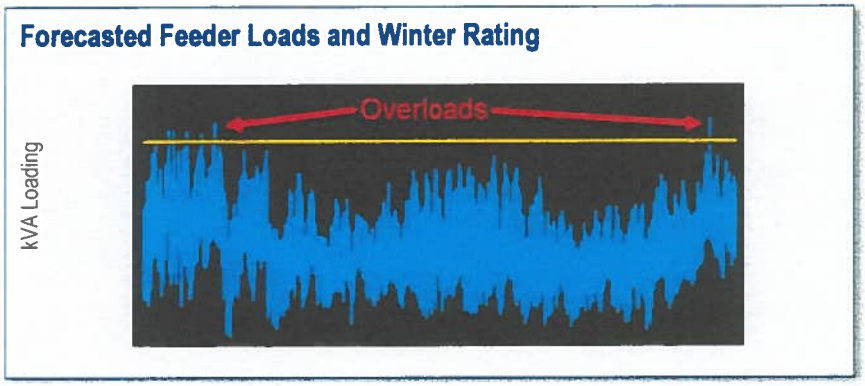
- From peak hour assessment to 8760 assessment

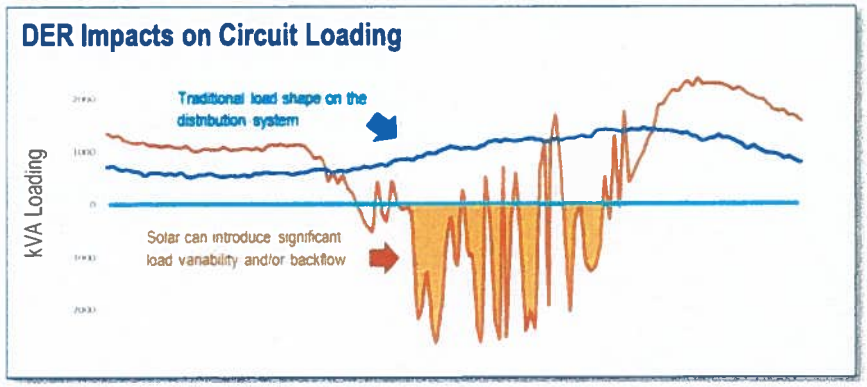
Assessment of new solutions

- DERs including battery storage systems
- Capture benefits of D-sited options for G and T

Automation of tools and configuration data

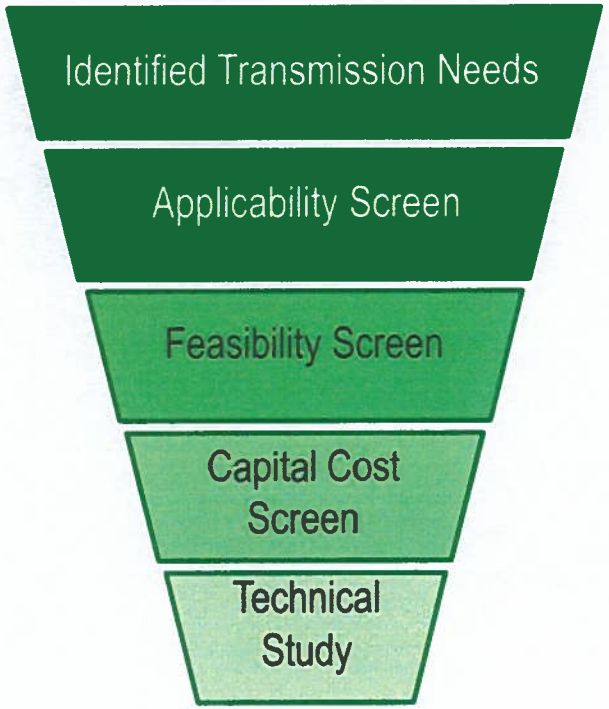
- Allows for more complex planning for a dynamic grid



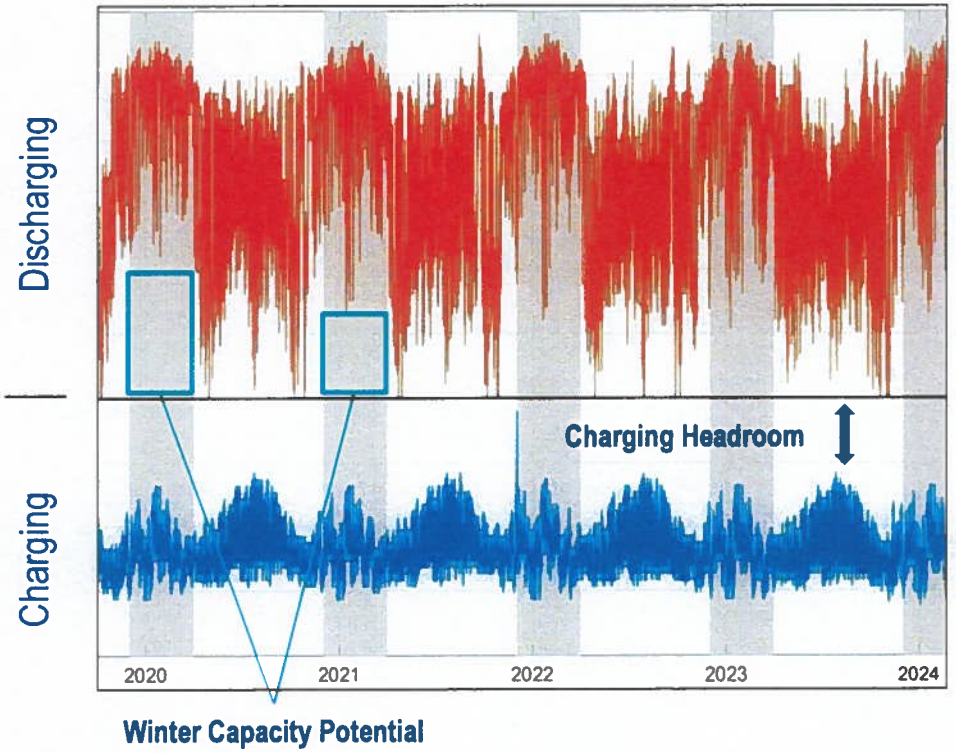


Evaluating Non-Traditional Solutions for Transmission

Screening for NTS Opportunities



8760 Power Flow Modeling *(Illustrative Battery Analysis)*



FORD DIRECT EXHIBIT 1

Net Energy Metering Stakeholder Meeting

April 23, 2020, 10:00 am – 12:00 pm

Remotely via GlobalMeet (link below)

Click this link to join the meeting.

Dial-In: (913)227-1201 **Passcode**: 158233

Agenda:

10:00 – 10:15

Welcome, Housekeeping, and Safety Briefing – Jacob Colley
March 12, 2020 Meeting Minutes – Leigh Ford

10:15 – 10:35 - Calculating Value of DER:

Value of DER according to Act 236 NEM DER Methodology – Jason Martin, Duke Energy

Direct and indirect economic impacts of NEM to the State and the value of DER components – Tyson Grinstead, Sunrun

10:35 – 11:05

Roundtable Discussion:
Direct and indirect economic impacts of NEM to the State
Other value of DER components

11:05 – 11:20

Successor Tariff and Rate Design – Lon Huber, Duke Energy

11:20 – 11:50

Roundtable Discussion:
Value in bundling with other utility programs like EE, DSM, NEM
Creative options have you seen throughout the country

11:50 – 12:00

Wrap Up and Next Steps

Contact Info:
Leigh Ford
803-528-5598
Leigh.ford@duke-energy.com

GlobalMeet Login Information:

URL - https://dukeenergy.pgimeet.com/Act62NEM

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Guest passcode: **158233**

Attendees:

Attendee		Organization
Tom	Beach	Crossborder Energy
Sharad	Bharadwaj	E3
Kullen	Boling	Central Electric Power Cooperative
Robert	Branton	Santee Cooper
Daniel	Brookshire	NC Sustainable Energy Association
George	Brown	Duke Energy
John	Calhoun	Santee Cooper
George	Cavros	Southern Alliance for Clean Energy
Maggie	Clark	SEIA
Jacob	Colley	Duke Energy
Ashley	Cooper	Parker Poe
Thad	Culley	Vote Solar
Tom	Delello	Gregory Electric
Nanette	Edwards	ORS
Margot	Everett	Navigent
Leigh	Ford	Duke Energy
Tyson	Grinstead	Sunrun
Carrie	Grundmann	Walmart
Karen	Hall	Duke Energy
Dana	Harrington	Duke Energy
Dawn	Hipp	ORS
Lon	Huber	Duke Energy
Maia	Hutt	Southern Environmental Law Center
Bryan	Jacob	Southern Alliance for Clean Energy
Alex	Knowles	ORS
Robert	Lawyer	ORS
Peter	Ledford	NC Sustainable Energy Association
Kate	Lee	Southern Environmental Law Center
Jason	Martin	Duke Energy
Lyndsey	McNeely	Duke Energy
Eddy	Moore	SC Coastal Conservation League
O'Neil	Morgan	ORS
David	Neal	Southern Environmental Law Center
Justin	Orkney	Duke Energy
Lisa	Perry	Walmart
Gretchen	Pool	ORS
Marcus	Preston	Duke Energy
Cole	Price	Central Electric Power Cooperative
Jim	Rabon	Santee Cooper
Shelley	Robbins	Upstate Forever
John	Rouff	AARP
Ben	Smith	NC Sustainable Energy Association
Kim	Smith	Duke Energy
Mark	Svrcek	Central Electric Power Cooperative
Ryder	Thompson	ORS
Neal	Williams	Lockhart Power
Bruce	Wood	Sunstore

Welcome!

Net Energy Metering Stakeholder Meeting

April 23, 10:00 am – 12:00 pm

Welcome, Housekeeping, and Safety Briefing
– Jacob Colley

March 12, 2020 Meeting Minutes and Breakout Session Overview
– Leigh Ford

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Value of Solar Methodology and Components

Jason Martin, Duke Energy

Act 62's Requirements

Section 58-40-20 (D)(3) states that:

In evaluating the costs and benefits of the net energy metering program, the commission shall consider the value of distributed energy resource generation according to the methodology approved by the commission in Commission Order No. 2015-194

NEM Proceeding – Value of Solar
DOCKET NO. 2014-246-E – ORDER NO. 2015-194

- Established methodology with Act 236 proceeding to identify the value a solar generator paired with a load center has to the utility.
- Identified the utility costs/benefits by the customer-generator from solar generation at their home or facility
- Methodology includes 11 components to be used in calculating Value of Solar.
- Components can be positive, negative or zero in value.
- Calculation is refreshed with the utility's annual fuel proceeding.

Act 236 Established VoS Components

Net Energy Metering ("NEM") Methodology

+/- Avoided Energy
+/- Energy Losses/Line Losses
+/- Avoided Capacity
+/- Ancillary Services
+/- Transmission and Distribution ("T&D") Capacity
+/- Avoided Criteria Pollutants
+/- Avoided CO2 Emission Cost
+/- Fuel Hedge
+/- Utility Integration & Interconnection Costs
+/- Utility Administration Costs
+/- Environmental Costs

= Total Value of NEM Distributed Energy Resource

Component Description

Methodology Component	Description	Calculation Methodology/Value
+/- Avoided Energy	Increase/reduction in variable costs to the Utility from conventional energy sources, i.e. fuel use and power plant operations, associated with the adoption of NEM.	Component is the marginal value of energy derived from production simulation runs per the Utility's most recent Integrated Resource Planning ("IRP") study and/or Public Utility Regulatory Policy Act ("PURPA") Avoided Cost formulation.
+/- Energy Losses/Line Losses	Increase/reduction of electricity losses by the Utility from the points of generation to the points of delivery associated with the adoption of NEM.	Component is the generation, transmission, and distribution loss factors from either the Utility's most recent cost of service study or its approved Tariffs. Average loss factors are more readily available, but marginal loss data is more appropriate and should be used when available.
+/- Avoided Capacity	Increase/reduction in the fixed costs to the Utility of building and maintaining new conventional generation resources associated with the adoption of NEM.	Component is the forecast of marginal capacity costs derived from the Utility's most recent IRP and/or PURPA Avoided Cost formulation. These capacity costs should be adjusted for the appropriate energy losses.

Component Description

Methodology Component	Description	Calculation Methodology/Value
+/- Ancillary Services	Increase/reduction of the costs of services for the Utility such as operating reserves, voltage control, and frequency regulation needed for grid stability associated with the adoption of NEM.	Component includes the increase/decrease in the cost of each Utility's providing or procurement of services, whether services are based on variable load requirements and/or based on a fixed/static requirement, i.e. determined by an N-1 contingency. It also includes the cost of future NEM technologies like "smart inverters" if such technologies can provide services like VAR support, etc.
+/- T&D Capacity	Increase/reduction of costs to the Utility associated with expanding, replacing and/or upgrading transmission and/or distribution capacity associated with the adoption of NEM.	Marginal T&D distribution costs will need to be determined to expand, replace, and/or upgrade capacity on each Utility's system. Due to the nature of NEM generation, this analysis will be highly locational as some distribution feeders may or may not be aligned with the NEM generation profile although they may be more aligned with the transmission system profile/peak. These capacity costs should be adjusted for the appropriate energy losses.
+/- Avoided Criteria Pollutants	Increase/reduction of SOx, NOx, and PM10 emission costs to the Utility due to increase/reduction in production from the Utility's marginal generating resources associated with the adoption of NEM generation if not already included in the Avoided Energy component.	The costs of these criteria pollutants are most likely already accounted for in the Avoided Energy Component, but, if not, they should be accounted for separately. The Avoided Energy component must specify if these are included.

Component Description

Methodology Component	Description	Calculation Methodology/Value
+/- Avoided CO_2 Emissions Cost	Increase/reduction of CO_2 emissions due to increase/reduction in production from each Utility's marginal generating resources associated with the adoption of NEM generation.	The cost of CO_2 emissions may be included in the Avoided Energy Component, but, if not, they should be accounted for separately. A zero monetary value will be used until state or federal laws or regulations result in an avoidable cost on Utility systems for these emissions.
+/- Fuel Hedge	Increase/reduction in administrative costs to the Utility of locking in future price of fuel associated with the adoption of NEM.	Component includes the increases/decreases in administrative costs of any Utility's current fuel hedging program as a result of NEM adoption and the cost or benefit associated with serving a portion of its load with a resource that has less volatility due to fuel costs than certain fossil fuels. This value does not include commodity gains or losses and may currently be zero.
+/- Utility Integration & Interconnection Costs	Increase/reduction of costs borne by each Utility to interconnect and integrate NEM.	Costs can be determined most easily by detailed studies and/or literature reviews that have examined the costs of integration and interconnection associated with the adoption of NEM. Appropriate levels of photovoltaic penetration increases in South Carolina should be included.

Component Description

Methodology Component	Description	Calculation Methodology/Value
+/- Utility Administration Costs	Increase/reduction of costs borne by each Utility to administer NEM.	Component includes the incremental costs associated with net metering, such as hand billing of net metering customers and other administrative costs.
+/- Environmental Costs	Increase/reduction of environmental compliance and/or system costs to the Utility.	The environmental compliance and/or Utility system costs might be accounted for in the Avoided Energy component, but, if not, should be accounted for separately. The Avoided Energy component must specify if these are included. These environmental compliance and/ or Utility system costs must be quantifiable and not based on estimates.

Thank You

Discussion

Economic Impact

Tyson Grinstead
Director, Public Policy
Sunrun

Economic Impact

- 58-20-40 (D)(4):
  - "The direct and indirect economic impact of the net energy metering program to the State"
    - Who has done this before?
    - What did the legislature intend?
    - What is the best way to handle this variable?
      - How many jobs have been created?
      - How much income reinvested in the local economy?
      - How much tax revenue has been generated?

What should be included?

- Direct
  - Purchasing local goods, services, property, labor. *For example, wages paid to solar installers, sales taxes, or property purchased for a warehouse*.
- Indirect
  - Goods purchased in order to do business or as a result of doing business. *For example, solar panels, trucks, advertising, goods purchased by solar employees with wages, property taxes.*

Successor Tariffs and Rate Design

Lon Huber, VP Rate Design and Strategic Solutions

April 23, 2020

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Agenda

- NEM 2.0 Trends
- Successor Tariffs and Rate Design
- Act 62 Tariff
- Innovative Solutions

Red, Purple and Blue States – Beyond NEM 1.0

- Nevada
- Maine
- Massachusetts
- Connecticut
- Indiana
- California
- Michigan
- Hawaii
- New Hampshire
- Utah
- Louisiana
- Arizona

NEM 1.0 Augments & Alternatives – Tools in the Toolbox

- Standby Charges
- Value of Solar Rate
- Feed-in Tariffs
- Grid Access Charge
- Net Billing
- Buy-all, Sell-all
- Higher Customer Charge
- Non-bypassables
- Demand Charges
- Separate Rate Class
- Time of Use (TOU) Rates
- V-DER Tariffs
- Least Cost Procurement
- Community Solar
- Load Factor Adjuster
- Minimum Bill

Primary Paths Away from NEM 1.0

	Fixed charge -or- Non-bypassable	Three-part rate -or- Time-of-use	Avoided cost -or- Proxy-based	Example Jurisdiction
Retail Rate Offset	X	X	**N/A**	APS (2013) CA (2016) MA (2016)
Net Billing	X	X	X	Hawaii (2015) AZ (2016) New York (2017) Michigan (2018)
Outside of Retail Rate	X	X	X	Austin (2012) TEP (2018) Maine (2017) CT (2018)

- **Retail Rate Offset**
  - Customers are credited for self-consumption and exports at the same rate according to the underlying retail tariff. However, additional charges including grid access fees and non-bypassable charges are applied.
- **Net billing & Export Differential**
  - Customers are credited for excess solar exported to the grid at a monetary rate that can be different (lower) than the self-consumption offset rate.
  - In the extreme – no credit or an export ban.
- **Outside of Retail Rate**
  - Compensation based on production of the PV system at a rate decoupled from a customer's underlying retail rate – typically a "buy-all, sell-all" arrangement.

Source: Adapted from *Lon Huber - Navigant*

Arizona Overview

- Net Billing
  - Arizona Corporation Commission passed Net Billing in December 2016
  - **Real-time netting**
- Export Differential
  - Utility's exported energy rate to be decided in each rate case using avoided cost methodology or resource comparison proxy (RCP)
  - Locked in for 10 years
  - **Currently using RCP – Rolling 5-year weighted average of utility-scale portfolio price**.
  - Limited to 10% reduction per year
  - Recovered through Fuel Adjustor and Renewable Tariff
- Separate rate class
  - **Mandatory TOU**
  - Self consumption rate determined by cost of service study
- Grid Access Fee
  - Based on capacity of DG system

Credit Rates and Export Windows for Interim Smart Export Program for the HECO Companies			
12 a.m. – 9 a.m.	9 a.m. – 4 p.m.	4 p.m. – 12 a.m.	
O'ahu	14.97 ¢/kWh	No credit	14.97 ¢/kWh
Hawai'i Island	11.00 ¢/kWh		11.00 ¢/kWh
Maui	14.41 ¢/kWh		14.41 ¢/kWh
Moloka'i	16.64 ¢/kWh		16.64 ¢/kWh
Lāna'i	20.79 ¢/kWh		20.79 ¢/kWh
The export credit rates will remain fixed for five (5) years.			

Solar Choice Plus Tariff

- Comprehensive approach
  - Solar Choice
    - Ensure fair and timely recovery of shared infrastructure and program costs
    - Manage excess exports closer to actual system use
  - Energy Efficiency and Demand Response
    - Time of use rates with dynamic and/or demand price signals
    - Align offering to power system need to ensure fair compensation to solar customers commensurate with system benefits for all customers
  - Bundling Opportunity - Think "solar +"
    - Incorporate additional technology

Thank You

Discussion

Next Steps – Leigh Ford

Thank you! Be safe!